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ABSTRACT

The authors describe program organization and teaching/learning procedures which can be employed in the remediation of mildly to severely handicapped students. Following an introductory chapter, Chapter 2 describes ways to manage educational resources such as time, aides, support staff, and student teachers to maximize learning. A brief third chapter considers determining what and how to teach and utilizing ongoing assessment. A final chapter reviews procedures which can be employed in designing programs for difficult to teach learners. An educational environmental approach is stressed which makes three basic assumptions: (1) skills are taught, maintained, and generalized through the systematic arrangement of the environment; (2) educators are responsible and accountable for delineating the most appropriate arrangements for individual learners; and (3) learners should be taught skills they can fluently use and generalize across environments. (SB)

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Instructional Technology: A Systematic Approach to Remedying Everyday Educational/Classroom Challenge

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CHAPTER I: INTRODUCTION

One of the great pleasures in life is observing someone learn and enjoy learning. Vicarious pleasure is derived from observing others master new tasks whether it is watching toddlers taking their first steps, first graders eagerly learning new sight words, or young adults learning the skills to succeed on their first jobs. It is a thrill to watch mildly handicapped learners who were previously considered failures in reading, math, and spelling proudly learning these tasks. Equally as rewarding is observing severely handicapped learners, for whom society in the past had little hope, mastering the skills to function more independently in integrated community vocational, domestic, and recreational environments. However, perhaps the greatest satisfaction comes from being the educator who structured the educational environment to facilitate such learning taking place.

Learning should be fun for the learners and teaching should be enjoyable for educators. Educational environments should be dyanamic and filled with organized learning. Such learning environments do not just happen, they are systematically planned and orchestrated by a competent educator. When educators are highly skilled in organizing educational environments they are able to provide a special kind of freedom to learners--the freedom to learn. In order for teaching to be effective the educator must not only orchestrate the overall learning environment but must also employ appropriate teaching/learning procedures to meet the individually determined needs of the learner.

Instructional technology as used herein has two basic components:

organization of the learning environment and development and implementation of teaching/learning procedures. However, instructional technology can be relatively ineffective unless it is accompanied by appropriate educational assumptions. Very simply, effective educational programming can be conceptualized as a three component equation consisting of program organization, teaching/learning procedures, and educational assumptions. Program organization (P.O.) plus teaching/learning procedures (T.L.P.) times educational assumptions (E.A.) equals amount of learning (A.L.).

(P.O. + L.P.) X (E.A.) = Amount of Learning

As depicted in the equation, the educational assumptions held by educators have a multiplier effect on the amount of learning. It may be the most important variable in the equation.

Educational programming should build on the assumption that if learners have not acquired skills, the environment has not been appropriately arranged. Learners don't fail; rather, instructional arrangements may be inappropriately designed for the learner. Given this notion, educators should be viewed as instructional environmentalists who assume that learning and lack of learning is a function of how the educational environment is arranged. For centuries scholars have engaged in debates about the differential contributions of biological and environmental variables in the development of behavior. The purpose here is to emphasize environmental variables which can be manipulated, rather than arguing about the relative effects of biological versus environmental variables.

As special educators we often encounter learners who manifest neurological, orthopedic, vision, and hearing impairments as well as degenerative diseases. In such cases, it may be tempting to attribute lack of skill

acquisition to biological variables. However, lack of skill acquisition by the learner, may in fact not be due to biological variables but rather a lack of an appropriate and systematic learning environment.

Environmentalists recognize the potential effects of biological factors on learning. However, rather than focusing on factors over which they have little or no control, educational environmentalists focus on arranging environmental variables and assessing the effects of the arrangement of skill acquisition. Environmentalists attempt to systematically arrange the learning environment to facilitate skill acquisition and neutralize or circumvent the effects of biological variables. When skill acquisition does not occur environmentalists systematically modify the learning environment to correct the problem and increase the likelihood that learning occurs.

It has been our experience that educators who systematically arrange the learning environment to facilitate skill acquisition and who are persistent have the most success. Persistence is a crucial attribute of an effective educator. Often the learning environment must be systematically modified several times before an effective environmental arrangement is derived for an individual learner. A persistent educator does not accept failure but continues to systematically analyze a problem and try out alternatives until an effective solution is found.

Effective educators are also educational determinists. That is, they actively decide in coordination with parents, support staff, administrators and significant others specific skills to teach individual learners. The educator who is an educational determinist takes the responsibility for determining instructional objectives and insuring that appropriate assessments are performed and instructional programs implemented. If skill

acquisition does not occur the deterministic educator attributes the result to a failure of the instructional program.

Educational empiricism goes hand in hand with educational environmentalism and determinism. Educational empiricism can be described by the following statement, "If a skill is important enough to teach, it is important enough to measure." That is, whether or not a learner can perform skills should be assessed prior to instruction and learner skill acquisition carefully monitored. An educational program may or may not result in skill acquisition. The educational empiricist uses systematic, ongoing assessment of learner progress to document program effectiveness. Assessment information is used to determine if a program is working and should be continued, if the program is not working and should be modified or if the learner has acquired the skill and should advance to the next step in a curriculum. As used here, educational programming or teaching involves prescribing what to teach, systematically arranging the learning environment to facilitate skill acquisition and/or to neutralize/circumvent the effects of biological variables while monitoring learner performance.

One of the primary barriers to learners' skill acquisition is often what we think we know about learning potential. For example, in the not too distant past we thought we knew that learners labeled trainably mentally retarded could not learn to read and that severely handicapped learners could not learn to function more independently in integrated community vocational, domestic, and recreational environments. Such limited expectations became self-fulfilling prophecies. That is, the limited expectations limited what was taught, thus fulfilling the expectations.

Today there is ample evidence that learners labeled trainable mentally

retarded can acquire reading skills and that severely handicapped learners can be educated to function more independently in integrated community settings. However, as a result of our past limited expectations, we have generations of handicapped people with educationally imposed skill deficits. As educators we must attempt not to replicate our past mistakes of arbitrarily limiting what learners are taught. Instead, we should assume that each individual learner has an unknown learning potential.

The assumption that each learner has an unknown learning potential does not imply that we will be successful in teaching all learners to acquire all the skills we attempt to teach. However, it does assume that if we systematically and persistently apply appropriate instructional technology that learners will acquire many more skills than our past expectations would predict. It is better to systematically and persistently attempt to teach a skill with the expectation that it will be learned than not to systematically and persistently try to teach the skill at all. Similarly, it is better to assume that lack of skill acquisition is due to the educational program rather than an inherent learner skill deficit. This assumption leaves the door open for educational environmentalists to search for better environmental arrangements for facilitating skill acquisition and/or circumventing biological variables. Even after repeated failures to teach skills, it is better to assume that the program failed than to blame the failure on a characteristic of the learner and forever inhibit further attempts to teach the skills.

The educational assumptions of environmentalism, determinism, empiricism, and unknown potential must be backed up by the educator's ability to deliver effective educational programs. Delivering such programs involves systematically and persistently employing the principles of instructional technology

to program organization and teaching/learning procedures.

This book primarily describes program organization and teaching/learning procedures which can be employed in the remediation of everyday educational challenges of educators of the mildly to severely handicapped. The book has been divided into three major sections. Chapter Two of the book encompasses educational program organization. It describes how to manage educational resources such as time, aides, support staff, and student teachers to maximize learning. Chapter Three articulates essential components of educational programming such as "what" and "how" to teach. Finally, Chapter Four describes basic procedures which can be employed to remediate everyday challenges to learner skill acquisition.

CHAPTER II: PROGRAM ORGANIZATION

An educational or classroom program can be conceptualized as a small organization. The members of the organization usually incude the teacher, aides, parents, and instructional resource personnel (e.g., speech therapists, physical therapists, guidance counselors). The goal of the organization is to provide appropriate and effective individualized educational programs to a select group of learners. The organization has a limited amount of time and resources to accomplish the goal. The members of the organization must carefully coordinate their efforts to make the maximum use of available resources.

The special educator should take direct responsibility for ensuring that appropriate and effective individualized educational programs are developed, implemented, and monitored for objectives in each learner's Individualized Educational Plan (IEP). That is, the special educator should assist members of the classroom organization in organizing their efforts to maximize the effectiveness and availability of the limited time and resources. It is important for special educators to provide this kind of assistance to classroom teachers in order to maximize the learner's chances to engage in newly acquired behaviors.

Although the function of many special educators has been to provide direct instruction to learners, the emerging role of the special educator involves as much resource and systems management as direct teaching. It is not unusual for educators to find that lack of program organization significantly inhibits the amount and efficiency of direct instruction.

In the not too distant past, few personnel resources were available to special educators. Today, many more resources are available such as aides, volunteers, and support personnel. Unfortunately, unless resources are appropriately managed, teachers can find themselves in a position where the

integrity of a learner's program is diminished because many people are responsible for different components of the program. Without one person being held accountable, the total program may become fragmented. With additional resources it may become necessary for the teacher to spend more time in meetings and activities to coordinate and monitor the resources and allocate less time to direct instruction. Unless resources are carefully orchestrated the addition of resources to programs may result in a fragmented educational program and can actually be relatively detrimental.

When several disciplines or resources are involved in assessing learners and in developing, implementing, and evaluating educational plans, someone has to be responsible for synthesizing the input from multiple sources into a cohesive and coordinated plan. As suggested by Diane Bricker (1976) the person responsible for this task can aptly be called an "educational synthesizer". The educational synthesizer's function is a natural role for the special educator when the learners of concern are or have recently been eligible for special education.

As an educational synthesizer the special educator can perform at least one or all of the following functions depending on the needs of individual learners.

1. The educational synthesizer can elicit IEP recommendations from relevant interdisciplinary experts such as physicians, physical therapists, occupational therapists, parents, speech therapists, reading specialists, and/or psychologists and translate them into measurable educational objectives for the learners' IEPs. With the ongoing technical and consultative assistance from such experts the educational synthesizer can develop, assist in the implementation and monitor effective educational programs which meet the objectives.

2. When interdisciplinary specialists are providing direct educational services in addition to technical assistance and consultation, the educational synthesizer can incorporate the direct services provided into the learners' IEPs. In addition, the educational synthesizer can insure that the direct service objectives are integrated and coordinated with other educa-

tional programs. For instance, if a speech therapist is providing direct therapy to a learner twenty minutes a day to remediate articulation and communication problems, the educational synthesizer can ensure that the skills acquired in direct therapy are taught throughout the day to facilitate skill maintenance and generalization.

3. When special education learners are being partially or fully mainstreamed into regular education classes, the special educator can provide technical assistance and support to the teacher in the mainstreamed environment to ensure continuity of the learner's IEP objectives and effectiveness of programming.

4. When special education learners are being transitioned from one special educational environment to another (e.g., from a full time selfcontained class to a part time resource room) within or across school districts, the special educators from the sending programs should provide technical assistance and support to the receiving special educators to ensure continuity of the learners' IEP objectives and effectiveness of the programming.

As illustrated by the functions of an educational synthesizer, the role of the special educator involves much more thatn providing direct instruction. Although the special educator must be able to provide effective and efficient direct instruction in order to be an effective educational synthesizer, the special educator must also work well with others, be a wise consumer of interdisciplinary services and be able to effectively provide technical assistance, consultation, and inservice training to others. All these skills are necessary to maximize the level of skill acquisition and social integration of students with handicapping conditions.

In order to be an effective educational program organizer and educational synthesizer the special educator should be competent in at least the following areas.

1. Maximation of Direct Instructional Time:
   a. Scheduling the educational day,
   b. Fitting direct instruction into the school day,
   c. Maximizing the use of instructional resources, and
   d. Fitting learners into group programs.

2. Management of Educational Resources:
   a. Delineating available resources,
   b. Utilizing available resources,
   c. Assigning and monitoring the accountability of resources, and
   d. Providing inservice training, consultative and technical assistant services to others.
3. Utilization of Instructional Technology:
   a. Assessing learner performance,
   b. Writing instructional objectives,
   c. Teaching/learning procedures, and
   d. Monitoring and evaluating the effectiveness of the teaching learning procedures.

Scheduling the Educational Day

Educational programs should be organized to serve the educational needs of the learners. The program organization should be designed to maximize the time and resources needed to meet the objectives specified on the IEP. IEPs should serve as the focal point for educational program organization. Any proposed organization should be critically evaluated in relation to its effect on learners and on meeting the IEP objectives.

One of the most significant factors in maximizing learner skill acquisition is the amount of time learners spend receiving direct instruction (Fredredericks, Anderson & Baldwin, 1979). Direct instructional time as used herein includes only time when direct and systematic instruction on objectives specified on the learner's IEP is taking place. For instance, music, recess, juice time, field trips, free time and so on cannot be counted as direct instructional time unless there are instructional objectives for the activities and a program to systematically teach and monitor acquisition of those objectives.

An initial step and interesting exercise related to maximizing instructional time is to calculate how much potential direct instructional time is available. First, line out a schedule of non-instructional

and potential direct instructional times which typically occur during the school day. An example schedule for an elementary school special education class is delineated. Don't include the time it takes to make transitions between activities as direct instructional time if there are no instructional objectives for that time.

Elementary

8:30 - 8:45	Learners get off bus, take off jackets.
8:45 - 9:00	Free play time.
9:00 - 9:15	Opening activities.
9:15 - 10:15	Potential instruction time.
10:15 - 10:40	Snack and toileting (Recess).
10:40 - 11:30	Potential instruction time.
11:30 - 11:45	Clean-up and preparation for lunch.
11:45 - 12:15	Lunch.
12:15 - 12:45	Free time, nap.
12:45 - 1:05	Toileting.
1:05 - 1:30	Potential instruction time.
1:30 - 2:00	Phys. Ed., Art, Music.
2:00 - 2:15	Quiet time activity.
2:15 - 2:30	Toilet, get ready for bus.

Unfortunately, the schedule depicted above is not atypical. It is noteworthy that the learners in the hypothetical program only have one hour and forty-five minutes of potential instructional time in a six-hour school day. It is more than likely that the learners are not being provided direct instruction for the total one hour and forty-five minutes of their potential instructional time. If one assumes a 180-day school, the learners have only 315 hours of potential direct instructional time out of the 1080 school hours available.

The amount of potential instructional time available will be dramatically reduced if, for instance, a bus frequently arrives late or other non-

direct instructional activities periodically infringe on available direct instructional time. Let's say that due to late buses, parties, emergencies, and so on, an average of 10 minutes of available direct instructional time is lost per day. Assuming a 180-day schoolyear, this accumulates to 30 hours of lost instructional time per year (a week of school)!

We have dwelt on instructional time to make two points. First, the amount of direct instructional time is one of the most important variables related to how many skills learners acquire. Second, the educator should carefully schedule instructional time and closely adhere to the schedule because seemingly small losses in direct instructional time per day result in significant yearly losses of instructional time.

After you have delineated a typical daily program schedule for learners, calculate how much potential direct instructional time is available. At a bare minimum, half of the school day should be potential direct instructional time. If less than half of the school day is potential direct instructional time, rearrange the schedule such that at least half of it is potential direct instructional time.

When more than half of the school day is potential direct instructional time you have completed an initial step in maximizing the amount of direct teaching. However, you have only begun. It is essential to emphasize that potential direct instructional time is often less than actual direct instructional time. As previously articulated, actual direct instructional time only includes the amount of time learners spend in planned, systematic instruction directly related to IEP objectives. Time spent in moving the learner from one direct instructional program to another, providing short

breaks between programs, preparing to implement programs and so on should not be counted as direct instructional time. Thus, we have to program more than half the school day as potential direct instructional time in order to achieve half the school day as actual direct teaching time. Devoting half the school day to actual instructional time is clearly a very minimum standard. Continuing effort should be placed on increasing the time available to well over half of the school day.

Once a schedule with ample potential instructional time is established, persistently adhere to it. When circumstances arise that infringe on the length of the school day, attempt to rearrange the day such that non-direct instructional activities are eliminated or abbreviated instead of direct instructional programs. Arrange for important social activities such as birthday parties, Christmas parties, Halloween parties, Thanksgiving parties and so on to occur during non-direct instructional times. When the amount of potential direct instructional time has been maximized, the next task is to fit the learners' direct instructional programs into the potential direct instructional times.

Fitting Direct Instructional Programs into the Time Available

Fitting the direct instructional programs a learner should be provided into direct instructional time available can be a very complex task. We have broken the task into subtasks in an attempt to make it easier. An initial step in fitting direct instructional programs to time available is to assign a reasonable amount of instructional time to each objective in learners' IEPs.

One approach to assigning instructional time to objectives is to provide equal programming time for each objective. In this manner instructional time can be conveniently blocked into uniform fifteen, twenty, or thirty

minute segments. However, a better approach is to prioritize learners' educational objectives on the basis of learner needs. For example, if a learner's primary need is in the area of reading, reading should be given priority. Similarly, when the learner's primary needs are in motor, communication or self-care, these areas should be given priority.

As a rule of thumb, objectives with the higher priorities should be allotted more instructional time than objectives with the lower priorities. If reading objectives are the highest priority objectives and cursive writing are the lowest, then, for example, reading may be allotted forty-five minutes of direct instructional time per day and cursive writing may be allotted ten or fifteen minutes.

It must be emphasized that when allotting high priority objectives, such as reading or communication, forty-five minutes of time does not imply that one forty-five minute reading instructional time has to be blocked into the day. There could be three fifteen-minute reading instructional times per day. In fact there is evidence which indicates that distributing instructional time on objectives throughout the day may be beneficial to learner skill acquisition, maintenance, and generalization (Mulligan, Guess, Holvoet, & Brown, 1980).

Once learner's total needed instructional time has been calculated, subtract the time from the potential instructional time available. If a learner's needed instructional time is greater than the potential instructional time available, some non-instructional activities may have to be shortened or eliminated. On the other hand, if potential instructional time available is greater than needed instructional time, do <u>not</u> increase the number or duration of non-instructional activities to fill up the time. First, carefully assess if there are skills learners should be acquiring which are not included in their IEPs. If there are, add these to the IEPs

and fill out the time with direct instructional programs. An alternative is to increase the amount of instructional time for objectives already in learners' IEPs.

Up to this point, the process of organizing the educational program has been based upon learner needs. We first determined learners' needs as indicated by their IEPs, then assigned each one a needed amount of direct instructional time and finally insured that the learner's needed instructional time was compatible with the direct instructional time available. Now comes the challenge. Although there may be enough time in a day to provide adequate direct instruction on each objective in learners' IEPs there may not be enough instructional personnel (e.g., teachers, aides, volunteers, student teachers) to implement programs for each objective.

It is educationally unsound to decrease the amount of direct instructional time on objectives or not to provide direct instruction on some objectives due to lack of instructional personnel. Decisions on what to teach learners and how much time to allot to direct instruction should be based on learner needs, not the resources which are currently available. In addition, when the number of current instructional personnel appears to be insufficient, the time and role of the current instructional personnel should be reallocated prior to requesting more personnel. Only when it has been determined that reallocating the time and roles of existing personnel will not solve the problem, should additional personnel be requested. The learners' IEPs, needed instructional time, and time commitments of instructional personnel can then provide the justification for more staff.

Grouping Learners for Instruction

Appropriately grouping learners for instruction can substantially reduce the number of instructional personnel required to implement direct instructional programs. At least three types of arrangements can be used to group learners for direct instruction: homogenous skill group instruction; heterogenous skill group instruction within the same skill domain; and heterogenous skill group instruction across skill domains.

A first step in grouping learners for direct instruction is to determine which learners have similar direct instructional needs. A chart similar to the one depicted in Figure 1 may be used to ascertain which learners have similar instructional needs.

FIGURE 1

CHART TO DETERMINE SIMILAR DIRECT INSTRUCTIONAL NEEDS

	SKILL DOMAINS			
Learners	Self Care	Reading	Community Living	Etc.
1. John	tie shoes	initial sight words	cross street make change	
2. Mary	brush hair	initial phonics	cross street	
3. Scott	tie shoes comb hair	initial sight words	make change	
Etc.				

List the name of each learner in the right hand column of the chart. Under Skill Domains list appropriate skill domains for learners in your

educational program. All of the learners' IEP objectives should fit into one of the skill domains. In the row next to each learner's name write the specific skills the learner should be taught under the appropriate skill domain. This chart provides a vehicle for determining which learners have similar direct instructional needs and can be grouped into either a homogenous skill group, a heterogenous skill group within one skill domain, or a heterogenous skill group across skill domains.

Homogenous Skill Group Instruction

Learners may be grouped into a homogenous skill group when they are functioning at approximately the same skill level within a skill domain and have very similar direct instructional program needs. For example, learners at approximately the same skill levels in reading, math, communication or self care could be grouped for instruction.

Within the homogenous grouping all the learners would simultaneously receive instruction on the same skills. For example, a reading group could be formed and all the learners could receive instruction on the same phonics skills through either teacher-made materials or a commercially available direct instructional curriculum. Likewise, if three learners are scheduled for direct instruction on the same self care or language skills, they could be grouped and taught simultaneously. Within a homogenous grouping arrangement, learners receive simultaneous instruction on the same skills.

A challenge to homogenous skill grouping is finding learners with approximately the same skill training needs within one skill domain. It is not educationally appropriate to place learners in a homogenous group arrangement when they do not have similar educational needs. Since all learners in the group will receive instruction on the same skills, learners

with dissimilar skill training needs may spend valuable direct instructional time learning or practicing skills which are not relevant to their needs.

A further challenge to a homogenous skill group arrangement is maintaining the integrity of the group. Learners within the group will acquire the skills being taught at different rates. At least three strategies may be employed when this occurs. One, drop the slowest and/or fastest learners out of the group and put them in a new group. Two, provide extra tutorial instructional time to the slowest learners in the group such that they can keep up. For example, in addition to providing group instructional time for learners falling behind, provide them with ten to fifteen minutes of daily tutorial instruction taught by a faster learner in the group, an aide or a student teacher. Three, switch from a homogenous group arrangement to a heterogenous group arrangement.

Heterogenous Skill Group Instruction Within the Same Skill Domain

This instructional arrangement involves grouping learners who have dissimilar skill training needs within the same skill domain. For example, a learner who is acquiring basic sight words could be placed in the same reading group as a learner acquiring phonics. Similarly, a learner requiring shoe tying skills could be placed in the same self-care group as a learner acquiring the skills to independently pull up pants. When using a heterogenous skill grouping arrangement, always attempt to group learners with the most similar direct instructional needs together to facilitate the learners incidentally acquiring relevant skills just a little ahead or behind where they are in a curriculum.

Two heterogenous skill grouping arrangements are round robin instruc-

tion and cooperative goal structuring. In a round robin arrangement the teacher provides direct instruction to learners in a round robin fashion first providing a few minutes or trials of instruction to learner A, then learner B, then learner C, and returning to learner A. Learners not being directly instructed should attend to the learner being instructed and wait their turns. Attending can be shaped by providing instruction (positive interactions) to learners who have been attending and ignoring those who have not been. Simple cues such as "I'll give John his turn because he watched me" often quickly shape up attending. Praising learners who attend also often quickly shapes attending.

Cooperative goal structuring is a technique which allows classroom teachers to heterogenously group students for academic subjects (Johnson and Johnson, 1975). Students with varying skill levels work together to acquire academic content and positive interdependence on one another. Utilizing the procedures associated with cooperative goal structures requires arranging contingencies which result in positive cognitive and affective learnings.

Heterogenous Skill Group Instruction Across Skill Domains

Heterogenous skill group instruction across skill domains differs from heterogenous skill group instruction within a skill domain only in that learners with direct instructional needs from different skill domains are grouped. For example, learner A may be acquiring shoe tying skills while learner B may be acquiring sight words skills through the teacher providing instruction in a round robin fashion. For reasons discussed previously, skill grouping across skill domains is not as advantageous as

skill grouping within skill domains.

One-to-One Instruction

This arrangement involves one instructional staff member providing direct instruction to one learner. Research has repeatedly demonstrated that group instruction is generally as effective or more effective than one-to-one instruction with mildly to severely handicapped learners (e.g., Alberto, Jobes, Sizemore, & Doran, 1980). Group instruction appears to be advantageous in that learners can acquire and practice skills through observing others in the group. In addition, group instruction can be used to teach such skills as turn talking, attending, and social skills.

One-to-one instruction should be the instructional arrangement of last resort. Learners should not be excused from group instruction because they do not attend or take turns, but should be included in group instruction to learn these skills. In addition to the advantages of group instruction on learner skill acquisition, it has the obvious advantage of significantly reducing the number of instructional staff needed to implement direct instructional programs. However, for group instruction to be maximally effective, group size should typically be limited to two to five learners (Becker, Engelmann, & Thomas, 1975).

After grouping learners for instruction, a chart similar to Figure 2 can be derived. As depicted in Figure 2 both group and one-to-one instruction are delineated. In addition, instructional time per grouping can occur in one time slot per day, be distributed into several time slots, and/or occur periodically throughout the week, depending on individual learner needs.

Fitting Skill Groupings Into the School Day

In order to fit skill groupings into the school day, currently avail-

FIGURE 2

CHART OF SKILL GROUPING

SKILL GROUPING	LEARNERS	AMOUNT OF TIME
1. Self-care: Heterogenous Dressing	John and Mark	20 minutes once a day
2. Reading: Homogenous sight words	John, Mark, Mary, Sue	15 minutes twice a day
3. Reading: Heterogenous Phonics and context	Scott and Sue	10 minutes
4. Language: Heterogenous signing	John, Mark and Mary	20 minutes once a day
5. Motor: Head control One-to-one Adaptive physical	John	10 minutes four times a day
6. Education: Heterogenous	All learners	30 minutes three times a week

able instructional resources have to be assigned to each grouping and a time slot for providing the instruction should be designated. Currently available instructional resources include teachers, aides, support staff (e.g., physical therapist, speech therapist), volunteers, parents, etc.

List each instructional resource and the times per day they will be available to provide direct instruction. Only list times for which there is a firm commitment. It is vital when scheduling student teachers, volunteers, and support personnel that they will regularly be available at set times on specific days. Without such a commitment we cannot plan on them regularly implementing direct instruction. Loose arrangements can result in significant losses of instructional time.

A chart similar to the one in Figure 3 may be used to list instructional resources.

FIGURE 3

INSTRUCTIONAL RESOURCE CHART

	TIMES AVAILABLE				
RESOURCES	MON	TUES	WED	THUR	FRI
Sally (aide)	All day →				→
Jim (aide)	9:00-11:00 →				→
Lilly (speech therapist)	9:30-10:00	1:15-2:45	9:30-10:00	1:15-2:45	
Mark (practicum student)		8:00-11:00		8:00-11:00	
Julie (student teacher)	All morning →				→
Teacher	All day →				→
Joe (adaptive P.E.)		2:00-2:30		2:00-2:30	
Mary (art teacher)	11:15-11:45		11:15-11:45		

As indicated by the chart the hypothetical educational program has many potential providers of direct instruction available. At least two potential problems exist with the time listed on the chart. One, the amount of time support personnel (e.g., the speech pathologist, adaptive physical educational teacher, and art teacher) can provide direct instruction is extremely limited. Two, the teacher listed him/herself as having all day available for providing direct instruction. Since the teacher must train aides and others to implement programs and monitor their program implementation it is not possible for the teacher to devote all day to direct instruction. The teacher who has to oversee program implementation by others should not list him/herself as available all day to provide direct instruction. Educator management of instructional resources will be discussed in detail later.

The limited amount of direct instructional time that resource personnel, such as speech therapists, physical therapists, occupational therapists, reading specialists, and adaptive physical education teachers, have often presents difficulties when learners' high priority direct instructional objectives are in areas of the resource personnel expertise. Typically, resource staff have large caseloads and thus have to allocate their direct service time among many needy learners. However, communication, motor or reading skill programming may be the learners' highest priority objectives, mandating that more direct instruction time be devoted to such programs than service staff can provide due to the size of their caseloads. The amount of instructional time should be based upon learner needs and should not be arbitrarily limited by the size of the resource staff's caseload. There are at least three solutions to this challenge.

a. Reduce Resource Staff Caseloads

Resource staff caseloads could be reduced such that they can provide more direct service to learners. This is a highly unlikely solution since it is expensive and resource staff in such areas as speech therapy, occupational therapy, physical therapy, and adaptive physical education are often in short supply nationwide. Even if the money were available to fund another position it might be difficult to fill.

More importantly, it has been cogently argued and demonstrated that, in general, resource personnel can often be better utilized in technical assistance and consultation roles than direct service provider roles (Sternat, Messina, Nietupski, Lyon, and Brown, 1977). We do not mean to imply that professional resouce personnel should not provide direct services. Our argument is that many learners can be better served through resource personnel providing technical assistance and consultation to teachers, aides, and parents on the development, implementation, and monitoring of direct services rather than providing it themselves. When it can be demonstrated that direct services cannot be provided through the specialist providing technical assistance and consultation to the special educator or parent, the specialist should provide direct services. If resource staff are used in technical assistance and consultative roles to direct instructional personnel, the amount of time allocated to programs in supprot service staff's area of expertise can be greatly increased.

b. Split Resource Personnel Time Between Direct and Consultative

Resource personnel time can be split between direct service provision and consultation/technical assistance depending upon individual learner needs. Within this approach instructional resource personnel can provide some direct services to learners and train the special educator, aides, student teachers, volunteers, and parents to provide additional services. In the best of all worlds, when resource personnel are providing direct services, they will provide them within the classroom such that the special educator can observe them and insure that skills taught are practiced and/or taught throughout the learner's day to facilitate skill maintenance and generalization.

c. Eliminate Direct Service Provision by Resource Personnel

Resource personnel can provide consultation and technical assistance to the educator and not provide direct services. This approach has an obvious disadvantage for learners who need direct services provided by resource personnel.

The position articulated above indicates that it would be unwise for special educators to use resource personnel full time for either consultation or direct instruction. Depending on the needs of the individual

learner, the time should be divided between direct instructional time and consultation/technical assistance.

Given the known resources we can now fit the learner program into the school day. A chart similar to that in Figure 4 may be used to block learners' programs into the school day.

FIGURE 4

CHART FOR MAPPING LEARNER'S PROGRAM INTO THE SCHOOL DAY

P = Program L = Learner/s I = Instructor

TIME OF DAY	MON	TUES	WED	THUR	FRI
8:30- 8:45	P = L = I =				
8:45- 9:00	P = L = I =				
9:00- 9:15	P = L = I =				
9:15- 9:30	P = L = I =				
9:30- 9:45	P = L = I =				
9:45-10:00	P = L = I =				
10:00-10:15	P = L = I =				
10:15-11:00	P = L = I =				

As illustrated in the chart the school day is broken into very small time blocks. This allows for flexibility in programming. A short fifteen-minute program can be scheduled in one block or a long forty-five minute program can be scheduled across three blocks. The times of day delineated in the blocks must of course be adapted to meet individual and class needs.

Listed in each time block on the chart are the program (P), learners (L), and instructor(s) (I). Through carefully and creatively allocating instructional personnel to skill and learner groupings we attempt to provide direct instruction for each learner through efficient utilization of current resources. However, even with careful and creative planning there may be a shortage of staff for providing direct instructional services. Additional staff are now justified and may be obtained through recruiting peer tutors, student teachers, and volunteers, or hiring additional aides.

After personnel have been assigned to learners' direct instructional programs and they have been integrated into the school day, further steps should be taken to increase the amount of direct instructional time available. Times in the day not slated for direct instruction can be transformed into direct instructional time by requiring learners to practice and generalize skills being taught during non-direct instructional times. For example, if a learner is acquiring functional reading and money skills, the learner could be taught to read a menu and make the appropriate change at lunch. A learner acquiring head control or communication skills can be required to practice the skills throughout the day. Learners acquiring dressing skills can be required to practice dressing and undressing skills upon arriving at and leaving school, and before and after toileting and

gym. Games and play activities can be devised for free time which require practice of acquired skills. Obviously, almost all nondirect instructional time can be made directly relevant to learners' IEP objectives. Transforming nondirect instructional time into direct instructional time does not just happen and must be carefully planned.

Once learners' programs are mapped into the schedule and appropriate instructional personnel have been assigned to provide direct instruction, the next challenge is to develop a system for training and monitoring the direct instructional services provided by others. We cannot merely assign instructional personnel to learners and delineate the skills to be taught in a specific time block and expect that effective direct instruction will occur. A system for training and monitoring the provision of direct and indirect instruction by others must be developed and implemented.

Training and Monitoring Instruction Provided by Others

An initial step in synthesizing direct instruction provided by others (e.g., aides, student teachers, support personnel) is to ensure that they have been assigned to carry out specific, direct instructional programs during prescribed time blocks. As previously described, a chart similar to that depicted in Figure 4 may be used to accomplish this task.

Instructional staff can be divided into two categories, resource and tutorial staff. Resource staff includes personnel with training and expertise in physical therapy, occupational therapy, reading, speech therapy, etc. Tutorial staff includes aides, volunteers, student teachers, peer tutors, etc. who will need training and close supervision in the implementation of direct instruction.

Managing Instruction Provided by Tutors

Typically tutors will have at least the following responsibilities:

1. Implementation of directional instructional programs as designed.
2. Monitor learner progress in direct instructional programs.
3. Summarize and/or graph data on learner progress in instructional programs.
4. Prepare materials for direct instructional programs.
5. Notify an educator immediately if they cannot implement a program as designed and/or are unable to implement a program at all.

Educators usually have at least the following responsiblities, related to teaching assistants:

1. Organize the educational program and assign direct instructional responsibilities.
2. Design direct instructional programs including teaching/learning procedures, data collection procedures, and graphs.
3. Train teaching assistants to implement direct instructional programs and collect and summarize data.
4. Frequently monitor implementation of direct instructional programs to insure that the programs are implemented as designed.
5. Meet regularly with tutors to make changes in direct instructional programs and provide feedback to tutors on their performance.

To facilitate tutors meeting their job responsibilities and the educator achieving his/her responsibilities, the educator should complete at least the following organization activities: a) the job roles of the tutors should be precisely defined and tutors should agree to fulfill the job roles; b) tutors should be provided with inservice training and technical assistance on skills necessary to fulfill their job roles; c) fulfillment of job role responsibilities should be frequently monitored to provide the tutor with feedback on performance and any necessary additional inservice training and technical assistance.

Tutors such as aides, student teachers, and volunteers should be hired or recruited to perform specific duties. Prior to hiring or recruiting tutors, the job roles should be precisely articulated to insure that tutors are fully aware of the scope of their responsibilities prior to accepting a position. The job role description should include at least the five responsibilities listed above plus other responsibilities that will be assigned such as assisting or transporting learners, monitoring recess and lunch, calling in when sick, arriving at work at specified time, etc.

After the job role has been defined and a tutor has been recruited and/or hired to fulfill the role the educator and tutor should jointly agree upon how performance will be evaluated and what technical assistance and inservice training will be provided to insure that the tutor obtains the necessary support and training to perform his/her job role. Such an agreement can be signed by the educator and teaching assistant to constitute an informal contract between them. The agreement can be written in a form similar to that depicted in Figure 5.

As illustrated in Figure 5, the educator can be extensively involved in monitoring tutor performance and providing the necessary inservice training and technical assistance. Performance monitoring and inservice training/technical assistance time should be mapped into the school day. A chart similar to the one depicted in Figure 4 may be used to organize technical assistance, program monitoring, and inservice training activities.

Synthesizing Educational Services Provided by Support Staff

The responsibilities of support staff may include at least:

1. Assessing learners and making recommendations on IEP objectives.

FIGURE 5

TEACHER ASSISTANT JOB AGREEMENT

Job Responsibilities	Indicators of Successful Performance	Supporting Conditions
1. Implemented direct instructional programs as designed	1. As judged acceptable by at least weekly observation by the educator	1. Inservice training and technical assistance on implementation of direct instructional programs and provided by the educator
2. Collect data on learner performance for each instructional program assigned daily and graph/summarize data	2. Weekly check by teacher of data collicted and summarized	2. Inservice training and technical assistance on data collection and graphing/summarization provided by the educator
3. Make appropriate change in direct instructional programs	3. Periodical observation of programs by educator	3. Weekly meeting to analyze learner data and design program changes plus training on how to implement changes

2. Providing technical assistance and consultation on the development, implementation, and monitoring of specific direct instructional programs.
3. Providing direct instructional or therapeutic services.

The special educator's role in relationship to resource staff can consist of at least the following responsibilities:

1. Translating professional staff recommendations into measurable IEP objectives and direct instructional programs.
2. Developing, implementing, and monitoring direct instructional programs given technical assistance and consultation by resource staff.
3. Including direct services provided by resource staff in the learners' days.

In order to accomplish these activities, a chart similar to the one depicted in Figure 4 may be used. Direct service and consultative/technical assistance times should be mapped into a weekly or monthly calendar.

Organizing Teacher Time

A major componet of classroom organization is time management. Thus far we have covered maximizing instructional time and organizing the time of others. Another vital time management component is managing teacher time or your own time.

An initial step in organizing your own time is to list all the tasks you have to complete and when they should be completed. Refer back to the charts in the previous sections which delineated when you were providing direct instruction, monitoring and training tutors, consulting with support staff, etc. The information from the previous sections should allow you to develop your own weekly, monthly, semester, and/or yearly calendars. Add to the information from the previous charts such activities as IEP meetings, IEP writing time, teacher conventions, etc. Organizing this information into weekly, monthly, semester, and/or yearly calendars

should help you organize your time in relationship to what has to be done and provide a vehicle for allocating enough time to the tasks and insuring that they are accomplished.

Just as it is important to carefully organize the learners' school time to insure that it is used efficiently it is also important to organize your time. Careful organization of your own time can often make an apparently overwhelming workload manageable.

One more aspect of personal time management is to make a calendar of tasks to be accomplished tomorrow and the time for accomplishing tasks and then try to adhere to your daily schedule. When things don't get done on time, reschedule them. One of the biggest enemies of teachers is time. Inefficient management of time can lead to frustration and burn out. Proper organization of time will typically improve the learners' instructional programs and your own job satisfaction.

As illustrated above, time management is a critical component of educational service delivery. Once the educational day has been organized to maximize direct instructional time and accomodate consultative, inservice training program monitoring and activities, a basic framework within which to provide direct instruction has been completed. In the next section we will describe basic components of direct instructional programs.

REFERENCES

Alberto, P., Jobes, N., Sizemore, A., and Doran, D. A comparison of individual and group instruction across response tasks. Journal of the Association of the Severely Handicapped. 1980, 5 (3), 285-293.

Becker, W., Engelmann, S., and Thomas, D.R. Teaching 2: Cognitive learning and instruction. Chicago: SRA, 1975.

Bricker, D. Educational synthesizer. In M. Angele Thomas (Ed.) Hey don't forget about me! Reston, VA: The Council for Exceptional Children, 1976.

Fedredericks, H.D., Anderson, R., and Baldwin, V. Identifying competing indicator of teachers of the severely handicapped. American Association of the Severely/Profoundly Handicapped Review. 1979, 4 (1), 81-95.

Johnson, D., and Johnson, R. Learning together and learning alone: Cooperation, competition, and individualization. Engelwood Cliffs, NJ: Prentice-Hall, 1975.

Mulligan, M., Guess, D., Holvoet, J., and Brown, J. The individual curriculum sequencing model (1): Implications from the research on maesel, disturbed or spaced trail training. Journal of the Association for the Severely Handicapped. 1980, 5 (4), 325-336.

Sternat, J., Messina, R., Nietupski, J., Lyon, S., and Brown, L. Occupational and physical therapy services for severely handicapped students: Towards a naturalized public school delivery model. In E. Sontag, J. Smith, and N. Certo (Eds.) Educational programming for the severely and profoundly handicapped. Reston, VA: The Council for Exceptional Children, 1977.

CHAPTER III: WHY ASSESS AND TEACH

Before an instructional program can be developed, a determination of the student's performance level must be made. In recent years there has been a trend toward developing and utilizing assessment procedures which are directly linked to the planning of instruction (Meyen, 1978; Haring, Lovitt, Eaton, and Hansen, 1978). In order for assessment data to be useful in instructional planning, questions related to "what to teach" and "how to teach" must be answered.

In the past, many teachers have relied primarily on assessment information derived from standardized testing instruments administered by support personnel. Although the data gathered from such instruments may be helpful in determining initial eligibility for special education services, it is often not appropriate for assisting a teacher in deciding what or how to teach an individual student. In order to provide information which is useful for instructional programming, teachers themselves are becoming increasingly more skilled at developing and utilizing assessment strategies which identify performance levels across a variety of academic, social, and self-help behaviors. Teachers are in the best position to measure specific behaviors becacause they spend more time observing and interacting with individual students than other professionals in the school. Questions such as "Under what conditions does a child learn best?" can be answered only through direct and frequent observation of student performance across a variety of tasks and learning environments.

Assessment that is directly linked to instruction provides teachers with a practical tool for determining appropriate educational goals and teaching strategies. Questions related to "what to teach" can be answered

through systematically observing student performance while manipulating the manner in which tasks are presented, the mode of student response and the system for providing feedback for correct and incorrect response.

Most important, assessment strategies designed to answer questions about what and how to teach can also serve as the basis for an ongoing monitoring system to determine the effectiveness of a teaching procedure or the appropriateness of a specific instructional goal. Professionals responsible for teaching handicapped students must be skilled at analyzing ongoing assessment information so that programs which are not effective can be quickly modified.

What to Teach

The determination of what to teach should be based on a number of considerations. First, normal child development literature can be helpful in making general estimates of expected behaviors for peers of the same age. Although the behaviors described at various developmental stages may seem overly ambitious or not ambitious enough, they do serve as a useful tool in identifying goals to aspire towards. Similarly, special education literature related to curriculum development can be used to develop short and long term goals in specific content areas. Commercially prepared curriculum materials can also be used to identify, as well as sequence, learning objectives.

In addition to the sources noted above, of prime importance is input received from parents and students relative to desired learning outcomes. Much can be gained from asking a parent or student what skills, if acquired, would make life easier and more fun.

Since the ultimate goal of public school education for handicapped students should be the acquisition of skills and knowledge which lead to

independent fuctioning, instruction should be provided in relevant academic, vocational, and personal/social areas. All instructional programs should provide opportunities for the student to use newly acquired skills in environments other than the classroom. In order to increase the liklihood of generalization occurring, skills and knowledge taught should be of a functional nature. Hence, goals and objectives should be chosen which facilitate more complex skill development and which increase the amount of independence and choice making behaviors in the world at large. In order for skills to be maintained over time, in different environments, and with different people, the consequences provided in the natural environment must be analyzed and programmed into instruction.

How to Teach

In order to determine the most effective and efficient strategy for teaching a skill to an individual student, a thorough analysis of the assessment information must be made. The questions which should be answered are "Under what conditions does the student learn best?" and "Where on a continuum of skills should instruction begin?" In order to maximize the usefulness of the assessment information, a teaching process aimed at continuous evaluation and adaptation is essential.

The steps inherent in such a process begin with the determination of entry level skills. Once this has been accomplished, goals and objectives can be specified. Next, through direct observation and careful analysis of student performance, specific learning problems can be pinpointed and teaching learning strategies designed to meet those identified needs. Finally, since the goals and teaching procedures have been clearly defined, evaluation becomes part and parcel of the entire teaching process, making revisions in goals and/or strategies a logical, simple and potentially frequent

event.

Since this section is primarily about "how to teach," issues related to various kinds of learning problems will be presented. In general, problems in learning occur during the initial acquisition stage, the proficiency or fluency stage and/or the maintenance stage. The specific teaching strategy that one might employ depends to a large extent on the state of learning at which the difficulties occurred.

Initial acquisition refers to the "period of learning when if performance falters, changes designed to provide information to the learner about how to perform the desired response have a higher probability than other strategies of promoting pupil progress" (Haring, Liberty, and White, 1980). Teaching strategies appropriate for problems in the acquisition stage involve manipulating the events before or after the student is provided with an opportunity to respond. Examples of such strategies include: use of physical, verbal, or signed prompts to assist the student in making the correct response; teacher demonstration, either before a response opportunity or following an error; varied delivery of directions (verbal, written, or symbolic, given singularly or in combination); and verbal feedback, specifically directed at the target behavior to let the student know she is on the right track.

Since ultimately the learner must demonstrate the newly acquired behaviors in settings other than the teaching environment, the strategies used to build the new behaviors should closely approximate those conditions in the natural environment. If strategies are required which involve more obtrusive teaching techniques, they should be eliminated as soon as possible.

Once a skill has been acquired, the next step usually involves increasing the rate, duration, or latency of responding. Students demonstrating

difficulties at this stage are experiencing proficiency problems. An example of a problem associated with rate is a student who can write the answers to multiplication facts if given thirty seconds per fact. The student may have initially acquired the responses, but is unable to functionally use the skills because of the slow rate.

Teaching strategies associated with proficiency problems include drill, practice and specific consequences for desired changes in rate, duration, or latency responding. Although there is little empirical evidence about ultimate criterion levels, there is some research which suggests that a high proficiency level may insure skill maintenance (Liberty, 1974).

In the final analysis a skill is not learned until a student can demonstrate its mastery with different people, in different environments and with different materials. Just because a student can correctly identify a circle and a square in the classroom, or correctly spell a set of words on a spelling test, does not necessarily insure that the student will make the correct response with a different teacher, in the classroom next door, or with materials that look different. When a student does perform a skill in response to new but similar stimuli, such as differing people, environments, or materials, generalization of learning has occurred.

For many non-handicapped students, generalization occurs without specific programming. However, for handicapped students, the complaint most often made by teachers and parents is "She learned that last month and now she can't remember it," or "He does it at home, but not at school." It may be, particularly for handicapped students, that strategies which teach generalization should be routinely incorporated into any instructional program. Activities which increase the likelihood of generalization of behaviors can be built into teaching learn-

ing strategies at the acquisition and proficiency stages.

Perhaps the most critical component of learning is the ability to adapt and modify acquired skills to meet the demands of differing environments. Adaptation requires that the student modify his/her responses to meet changes in the environmental conditions. To learn this process, students must have the opportunity to apply previously learned skills and knowledge to solve more complex problems. Teaching situations designed to facilitate self-initiated performance and problem solving behaviors must be programmed and viewed as a part of the teaching sequence.

Monitoring Progress

The purpose of utilizing ongoing assessment procedures is to determine whether or not educational strategies have been effective in teaching the specified objectives. Ongoing assessment should provide the teacher with information about when and in what manner teaching strategies should be redesigned or new skills introduced.

There are a number of techniques which classroom teachers can use to systematically collect information on the effectiveness of instructional strategies. Data which is collected for instructional decision making is generally derived from two sources: permanent products which result from student performance and direct observation of student behavior.

Examples of measures obtained from permanent products include the number of multiplication facts written correctly, the percentage of written sentences containing subjects and predicates and the rate of assembling a puzzle. Measures of this type are relatively simple to collect and if recorded on a systematic and frequent schedule provide valuable information.

Data collection techniques designed for measuring student behaviors which do not leave a permanent product all involve direct and systematic observation

of performance. Examples of behaviors that a teacher might want to collect observational data on include verbal interactions between peers, self-initiated question asking and tantrums. The following types of data can be collected through direct observation:

1) Frequency measures -- Measures of frequency are used when information is needed about the number of times a behavior occurs within a specified time frame. Examples of behaviors for which frequency measures might be collected include talk outs and questions asked.

2) Duration measures -- If a teacher is interested in knowing how long a behavior occurs, and the behavior is ongoing, such as thumbsucking or rocking, measures of duration are most appropriate.

3) Latency measures -- If information is needed about the length of time elapsed between the presentation of a stimulus and the occurrence of behavior, measures of latency are useful. An example is the length of time elapsed between the time directions were given to begin a written assignment and when the assignment was actually initiated.

The information presented in this chapter has emphasized the importance of direct and frequent assessment in order to determine what and how to teach. Only through careful and systematic analyses of actual student performance can teaching learning procedures be designed to address each learner's strengths and weaknesses. The following chapter will discuss the development and application of teaching learning strategies to specific instructional problems.

REFERENCES

Haring, N.G., Liberty, K.A., and White, O.R. Rules for data-based strategy decisions in instructional programs: Current research and instructional implications. In W. Sarlor, B. Wilcox, and L. Brown (Eds) Methods of instruction for severely handicapped students. Baltimore: Paul H. Brookes Publishers, 1980.

Haring, N.G., Olvitt, T.C., Eaton, M.D., and Hansen, C.L. The fourth R in the classroom. Columbus, OH., Charles E. Merriel. 1978.

Liberty, K.A. The non-effect of practice on maintenance of spelling words learned to criteria. Unpublished manuscript. Working paper No. 28. Experimental Education Unit, Child Development and Mental Retardation Center, University of Washington, 1974.

Meyen, E.L. Exceptional Children and Youth. Denver, CO: Love Publishing Co., 1978.

CHAPTER IV: SELECTED TEACHING/LEARNING PROCEDURES

As used herein, teaching/learning procedures described "how" to teach a skill. They encompass systematic environmental manipulations which facilitate skill acquisition, proficiency, maintenance, and generalization. The research and writings on teaching/learning procedures are voluminous and reviews can be found in such sources as Haring, Lovitt, Eaton, and Hansen (1978); Snell (1978); and Haring and Schuelfebush (1976). It is not the intent of this chapter to review the literature or explore the wide variety of teaching/learning procedures described in the literature. Our primary focus will be on selected techniques that research and our experience have demonstrated to be particularly helpful in designing instructional programs for difficult to teach learners.

Prior to designing teaching/learning procedures, the following tasks should be accomplished:

1. The skills to be taught should be clearly identified and delineated in the form of instructional objectives.
2. A rationale as to "why" to teach the skill should be articulated. The rationale should justify teaching the skill on the basis of at least;
    a. An assessment of the learner's current skill strengths and deficits.
    b. A delineation of how acquisition of the skill will directly relate to increased learner independence in current and future environments or subsequent related tasks.
3. Tasks of daily living should be identified in which the learner can be taught to immediately and functionally apply the skills. For example, if money is being taught, one functional task would be to teach learners to purchase items at a store. Reading can be made immediately functional by teaching and requiring learners to read restaurant menus, recipes, community signs, and leisure time materials. Self-care skills can be made functional by requiring learners to practice skills at appropriate times throughout the day such as when dressing and undressing for recess, gym, swimming, and so on.

As educational environmentalists we teach skills through systematically modifying learners' environments. Basically, we can modify environmental events which occur before a skill is to be performed and/or which occur immediately after a skill is performed (Lindsley, 1964). Environmental events which occur prior to skill performance are called antecedent events and events which directly follow the performance of a skill are called subsequent events. Chart 1 displays examples of several skills in the context of antecedent and subsequent events.

In addition, the environment can be modified to circumvent learner sensory and motor deficits. Antecedent and subsequent events can be adapted to learner information output modes (White, 1980). Basic learner information input modes include auditory, visual, and tactual. Obviously, visual and tactual antecedent and subsequent event modes could be selected for totally blind learners. For example, signs, gestures, pictures, printed symbols, and tactual cues (e.g., the learner touches/feel items to learn about them) can be used in the instruction of deaf learners and verbal cues, sounds, and tactual cues can be used in the instruction of blind learners.

The response mode learners use to indicate knowledge of a skill can also be individualized on the basis of the responses learners can perform (White, 1980). For example, a nonverbal learner could use signs, gestures, written responses, or a communication board to indicate knowledge of skills. Chart 2 illustrates selected antecedent events, input modes, output modes, and subsequent events which may be used singularly or in combination based upon individual learner needs.

CHART 1

Example Antecedent Events (A.E.), Skill (S.),
Subsequent Events (S.E.) Schematics

A. Math Workload

A.E.	S.	S.E.
Addition facts, problems presented in an equation format (e.g., 2 + 4 = ___)	Learner writes correct answer for problem	Teacher scores as correct and praises learner for achieving at least 90% correct
	Learner writes incorrect answer	Teacher scores as incorrect, describes how to solve problem and requires the learner to correct errors

B. Phonic Reading

A.E.	S.	S.E.
The learner is presented a phonetically programmed reader and asked to read a passage aloud	Learner sounds out words and reads them correctly	Teacher periodically praises learner
	Learner fails to read a word correctly	Teacher redirects learner to sound out word and read it correctly

C. Self-Care: Put Shirt On

A.E.	S.	S.E.
Teacher presents a shirt and asks the learner to put the shirt on	Learner puts shirt on correctly	Teacher periodically praises learner
	Learner puts shirt on incorrectly	Teacher models the correct responses and asks learner to "try again"

CHART 2

Selected Input and Output Mode

Antecedent Event Modes	Learner Input Modes	Learner Output Modes	Subsequent Event Modes
Auditory	Hearing	Verbal	Auditory
		Writing	
Visual	Sight	Signs/ Gestures	Visual
Tactual	Feel	Communication Board	Tactual

It is often advantageous when designing instructional programs for sensory impaired, motorically impaired, and severely handicapped learners to translate skills into functions (Williams and Fox, 1977; White, 1980). For example, walking, toothbrushing, verbally labeling objects and actions, and addition/subtraction are skills we typically teach learners. However, some learners may currently be unable to acquire such skills. For these learners, the skills can be translated into functions and the learners can be taught alternative ways to perform the functions. As depicted in Chart 3, to derive functional alternatives, we first list the skills of concern, then articulate the function the skill serves and finally we delineate alternative ways the functions can be accomplished.

Let us say the target skill is producing single word utterances. Vocalizing could be selected as the first choice for producing single word utterances. Generally, the behavior indicated by normal development for carrying out the function would be concentrated on because it is usually the most typical, appropriate and least restrictive. If it is determined that the learner does not currently have the requisite skills to vocalize, an augmentative method could be chosen such as signing or a communication board.

Two cautions must be made in the delineation of functional alternatives. It may seem as if one functional alternative must be selected. In the area of communication, this is clearly not the case and often the learner should be

CHART 3

Deriving Functional Alternatives

Skill	Function	Functional Alternatives
Walking	Move body through space	Cane, walker, wheelchair
Toothbrushing	Clean teeth	Electric toothbrush, waterpick, use washcloth
Verbally label objects and actions	Describe the environment and indicate wants and needs	Signs, gestures, communication board
Addition/ Subtraction	Budget money, make change, etc.	Hand calculator, money chart

simultaneously acquiring skills in each of several communication modalities. Comparative progress in each of the modalities would then be used as data to select the best augmentative system. Functional alternatives must be considered from the onset of a learner's individualized plan for services, but the selection of functional alternatives should not be made in a rushed fashion or in the absence of data. Neither must the selection of one alternative always be made over another. In the area of communication, it is possible that the learner may simultaneously vocalize and/or sign while operating a communication board.

A second caution regarding the selection of functional alternatives is that alternatives to the typical way of performing functions are usually restrictive. For instance, signing can be chosen as an alternative for speech. However, the individual using signs is restricted to communicating with other people who also have a knowledge of signing. There is a limited communication audience. On the other hand, communication boards restrict the individual to carrying around a board to communicate. Selection of functional alternatives have to be carefully considered by parents, teachers, and support staff (e.g., speech therapists, motor specialists) to insure that the functional alternative does not unnecessarily rule out learners acquiring the "typical" way of fulfilling functions and the alternatives are as typical, age appropriate, and least restrictive as possible.

As delineated by Brown, Branston, Baumgart, Vincent, Falvey, and Schroeder (1979), functional alternatives can also be derived by providing personal assistance, adapting activities, adapting sequences, or adapting rules. Personal assistance involves providing assistance on only those elements of an activity the learner cannot perform. For instance, if a learner can select food items and pay a cashier but cannot carry a food tray, someone could carry

the tray to allow the learner to participate in the other activities.

Adapting activities involves changing the activity to allow for more independence or complete independence. An example is making waffles. If the waffles are made from a mix, the learner may need assistance in measuring out the ingredients. However, if toaster waffles and a toaster are provided, the learner may be able to acquire the skills to complete the activity more independently or with complete independence.

Adapting skill sequences involves changing the sequence in which skills are performed. As an example, purchasing foods in a fast food restaurant typically involves the following sequence of skills: waiting in line, placing an order, taking money out of the wallet, paying the cashier, and taking the food to a table. A learner who has difficulty taking out a wallet and securing money from it may perform these skills at a slow rate which is not acceptable to either the cashier or other customers waiting in line. The learner could be taught to take out the wallet while waiting in line to accomodate the rate problem.

Adapting rules includes changing the rules of, for instance, games, such that individuals can participate in them. Examples include, changing the distance between stakes in a game of horseshoes, lowering the net in volleyball, and giving points for hitting the volleyball rather than requiring that the ball travel across the net.

Often it is not the learners' skill deficits that limit their functioning in community environments but our lack of teaching them functional alternatives. This brief discussion illustrated ways in which the educational environmentalist can systematically modify the environment to circumvent the effects of biological variables. In the next section of this chapter we will be primarily concerned with how the educational environmentalist can systematically arrange

antecedent and subsequent events to facilitate skill acquisition, proficiency, maintenance, and generalization. The procedures described herein are based upon basic learning principles which have been systematically researched (e.g., Snell, 1978; Haring, et al., 1978; and Haring and Shiefelbush, 1976). We will not attempts to articulate all the procedures which can be employed to facilitate skill acquisition and have arbitrarily divided teaching/learning procedures into small step training and error analysis.

Small Step Training

It has been repeatedly demonstrated that learning is facilitated when skills or educational objectives are broken into small steps which lead from an individual's current skill level to acquisition of the objective (e.g., Horner and Kailitz, 1975; Resnick, Wang, and Kaplan, 1973; and Smith, Smith, and Edgar, 1976). Small step training has been referred to by various educators as concept analysis, task analysis, component analysis, etc. Herein, we will describe three basic ways to break objectives into small training steps: a) changing conditions in small steps, b) changing behavior in small steps, c) changing criteria in small steps. The three procedures are based upon the three components of an intructional objective which include conditions, behavior, and criteria. Sample instructional objectives are depicted in Chart 4.

As illustrated in Chart 4, the instructional objectives precisely delineate the conditions under which the skill is to occur, define the skill in observable and measurable terms and articulate at what criteria the skill has to be performed to be considered acquired. Direct instruction as use here consists of teaching learners to perform skills under the conditions and at

CHART 4

Sample Instructional Objective

A. Math Facts

Condition	Behavior	Criterion
Given a paper, pencil and a single digit addition math fact sheet, with the 20 problems in equation form (e.g., 4 + 4 = __, 8 + 3 = __)	The learner will write answers to each problem	Completing the sheet within one minute and achieving a score of 90% correct on two consecutive sheets

B. Sight Words

Condition	Behavior	Criterion
Given a sheet with the "Dolch" sight words printed on it in random order and a cue to read the words	The learner will read each word on the sheet	Within 2 minutes with at least 90% accuracy on two consecutive occasions

C. Put Hat On

Condition	Behavior	Criterion
Given a stocking cap, a cue to "put hat on"	The learner will a. pick up the hat b. open the hat c. put hat on head d. pull hat down	Correctly within 3 seconds on nine out ten consecutive occasions

D. Rolls Over, Back to Stomach

Condition	Behavior	Criterion
The learner on his/her and given a high preference item such as a toy presented to left or right, just out of reach	The learner will a. Reaches across body with arm to obtain item b. Turns head to same side c. Flexes top leg up and across body d. Rolls onto side e. Rolls onto stomach f. Free arms	Correctly and in sequence on three out of four trys on two consecutive occasions

the criterion specified in the instructional objectives.

Changing Conditions in Small Steps

When a learner performs a skill but does not perform the skill under the desired conditions, instruction can be designed to systematically transfer control of the skill performance from conditions which already control skill performance to the desired conditions (Streifel, Bryan, and Aikens, 1974; Streufel and Wetherby, 1973; and Haring and Gentry, 1976). For example, let's say we are interested in teaching a learner to read the words "ball" and "cup". If the teacher holds up a ball or cup and asks "What is this?" or simply asks the learner to say "ball" or "cup", the learner says "ball" and "cup". The problem is that wehn the teacher holds up a flashcard and asks "What word is this?" the learner does not correctly label the flashcard words as "ball" and "cup". In this example, the learner can consistently perform the desired response of saying "ball" and "cup", but he/she does not perform the response under the desired conditions (i.e., when presented a flashcard and asked "What is this word?"). Two conditions already control the response: the presence of the objects and the teacher asking "what is this?", and the teacher asking the learner to say "ball" or "cup". The instructional challenge involves transfering control of the responses from the conditions which already control them to the desired conditions.

The term prompt will be used subsequently in reference to conditions which consistently evoke the desired response. Prompts may be categorized into at least verbal, gestural, model, highlighting, and physical assistance prompts (Haring, Liberty, and White, 1980). Chart 5 depicts skills hypothetical learners can perform, conditions under which they consistently perform the skill, the type of prompts which controls skill performance, and the desired conditions for skill performance.

Chart 5

Example Conditions (Prompts)
Which Control Desired Skill Performance

Skill	Conditions under which skill is consistently performed	Type of Prompt	Desired Conditions
1. Prints name	When given a sheet of paper with his/her name printed on it, a pencil and cue to "print your name" the learner prints name by tracing the model of the name on the paper.	model of printed name	When given a lined sheet of paper, a pencil and a cue to "print your name", the learner prints his/her name
2. Reads printed words on flashcards	When the teacher holds up a flashcard and models the correct response by saying "This is the word (____)" and then asks "What is this word" the learner says the correct word	model	When the teacher holds up a flashcard and asks "What is this word", the learner says the correct word
3. Puts hat on	When the teacher says "Put hat on" and immediately provides partial physical assistance, the learner puts on his/her hat.	physical assistance	When the teacher says "Put hat on" the learner puts his/her hat on.
4. Setting the table	When place settings are provided, the teacher says "set the table" and verbally cues each step in setting the table such as "Put a placemat at each chair", "Put a plate on each placemat" etc., the learner performs the skills correctly	verbal prompt	When provided place settings and a cue to set the table, the learner independently sets the table.
5. Visual discrimination - Discriminating the letter b from d	Presented the letter b and d with the distinctive features of one letter highlighted (e.g. the circular stroke of the b is colored red) when the teacher alternately asks "show me b" and "show me d" the learner touches the correct letter	highlighting cue	Presented the letter b and d and alternately asked to "show me d" and "show me b" the learner touches the correct letter
6. Follows directions to "stop" "stand up" "sit down" "come here"	When provided verbal directions to "stop, stand up, sit down, come here" paired with a gesture cue, the learner performs the correct behavior	gesture prompt	When provided verbal directions to "stop, stand up, sit down, come here" the learner will perform the correct behavior

To bring a skill under the control of the desired conditions, one must first select a prompt which already consistently evokes the skill and transfer control of the skill from the prompt to the desired conditions. Two procedures which can be used singularly or in combination to facilitate transfer of control from prompts to the desired conditions are instructional prompts and correction prompts.

Instructional and Correction Prompts

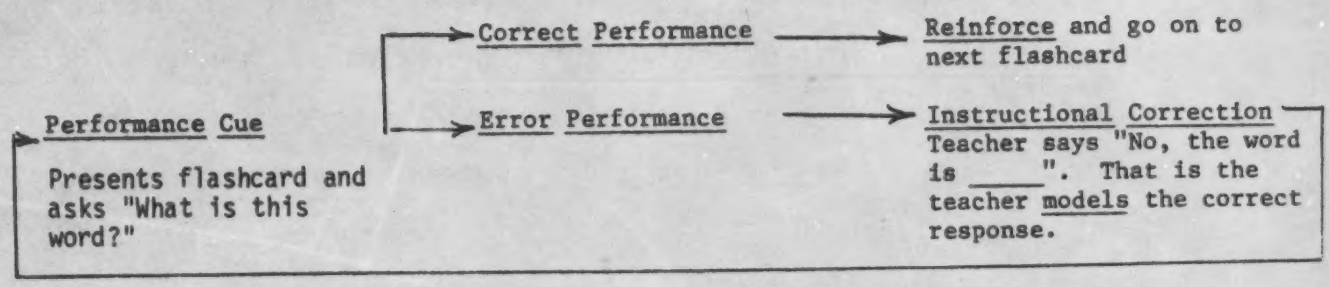
As used here, correction prompts involve prompting the correct performance of a skill after an error performance. Correction prompts are illustrated in Chart 6. As depicted in the chart, first the learner is cued to perform the skill. If an error occurs, the teacher provides a prompt which consistently evokes correct performance of the skill. After prompting the skill, the teacher recues the learner to perform the skill. The cycle of cue skill performance, error performance, instructional correction, cue skill performance and so on can be repeated until the learner performs correctly.

As used here, instructional prompts involve prompting or teaching a skill prior to requesting the learner to perform it. Chart 7 illustrates the instructional prompt paradigm. Instructional prompting is a common teaching format. For example, teachers typically model and verbally describe how to solve math fact problems, sound out words, or print a letter of the alphabet prior to requiring learners to perform the skill. Most workbooks first demonstrate

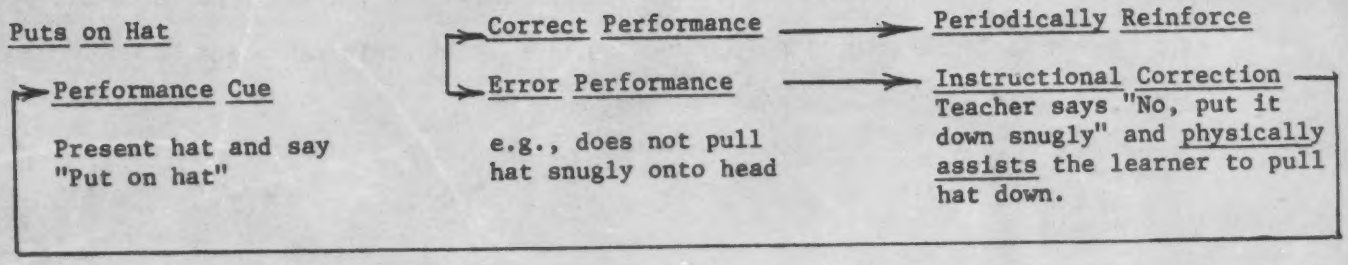
CHART 6

Illustrations of Correction Prompts

Reads Flashcards


Performance Cue
Presents flashcard and asks "What is this word?"
Correct Performance
Reinforce and go on to next flashcard
Error Performance
Instructional Correction
Teacher says "No, the word is ____". That is the teacher models the correct response.

Puts on Hat


Performance Cue
Present hat and say "Put on hat"
Correct Performance
Periodically Reinforce
Error Performance
e.g., does not pull hat snugly onto head
Instructional Correction
Teacher says "No, put it down snugly" and physically assists the learner to pull hat down.

(model) correct responses prior to the learners completing an exercise.

Once a skill is consistently performed correctly when directly preceded by an instructional prompt, the prompt should be eliminated. When instructional prompting has been eliminated, a correction prompt paradigm is implemented. That is, incorrect skill performance is only prompted after an error response.

When instructional prompting is employed we can break the conditions of almost any educational objective into at least two steps. We first teach learners to consistently perform the skill correctly when skill performance is directly preceded by an instructional prompt. Instructional prompting is then eliminated and a correction prompt paradigm is employed. As a rule of thumb it is typically more effective to initially teach <u>new</u> skills to difficult to teach learners through instructional prompting. Once a learner is performing at 70 to 100 percent accuracy instructional prompts can be eliminated and the correction prompt paradigm employed (Haring, et al., 1980). Chart 8 illustrates how three educational objectives can be broken into two steps by changing conditions.

The two step instructional cueing paradigm described above is effective with many learners. When the two step instructional prompt paradigm is ineffective, instructional prompts can be eliminated in smaller steps.

CHART 7

Illustrations of Instructional Prompts

1) Reads Flashcards

	Correct performance →	Reinforce and go to next flash card.
Instructional cue: The teacher holds up a flash card and models the correct response (e.g., say, "this word is boat") and then asks "what is this word?"	Error performance →	Repeat instructional cue.

2) Completes Addition Problem

	Correct performance →	Reinforce.
Instructional cue: The teacher models solving addition problems on the blackboard and then hands out work sheets and asks students to solve the problem.	Error performance →	Repeat instructional cue.

3) Puts on Hat

	Correct performance →	Reinforce.
Instructional cue: The teacher says "put on hat," immediately physically assists the learner in putting on hat and then says "now you do it."	Error performance →	Repeat instructional cue.

CHART 8

Examples of Changing Conditions
In Two Steps to Eliminate
Instructional Prompts

A. Sight Words - Flashcard

Condition	Objective Behavior	Criterion
When presented flashcards, one at a time, and the teacher says "What is this word?"	The learner reads words	Correctly within 1 second on 9 out 10 trys, across consecutive sessions
Changing Conditions	**Behavior**	**Criterion**
1. The teacher presents a card, models the correct response (says "This word is ____") and asks "What is this word?"	Same	Same
2. The teacher presents a card and asks "What is this word?"	Same	Same

B. "b" - "d" Discrimination

Condition	Objective Behavior	Criterion
When the teacher presents a "b" and a "d" and alternates asking the learner to "Touch a 'b'" and "Touch a 'd'"	The learner touches	The correct letter within 2 seconds on 9 out of 10 trys, across two consecutive sessions
Changing Conditions	**Behavior**	**Criterion**
1. When the teacher presents a 'b' with the circular stroke highlighted (e.g., colored red), and a 'd' and alternates asking the learner to touch 'b' and 'd'	Same	Same
2. When the teacher presents a 'b' and a 'd' and alternates asking the learner to touch 'b' and 'd'	Same	Same

CHART 8 CONTINUED

C. Put Hat On

Objective		
Conditions	**Behavior**	**Criterion**
When presented a hat and asked to "Put hat on"	The learner will put on hat	Correctly within 5 seconds on 5 out of 6 trials across two consecutive sessions
Changing Criterion	**Behavior**	**Criterion**
1. When the teacher says "Do this" and models putting on hat and then says "Put on hat"	Same	Same
2. When presented a hat and asked to "Put on hat:	Same	Same

Reducing Instructional Prompts in Small Steps

In the instructional prompt paradigm described above, learners were taught to consistently perform skills correctly when skill performance was immediately preceded by a prompt. Then the prompt was abruptly eliminated and a correction prompt procedure was eliminated. Abruptly eliminating the instructional prompt is too sudden a change in conditions for some learners and can result in high levels of errors. For such learners it is often more effective to systematically eliminate instructional prompts in small steps. Systematically eliminating instructional prompts in small steps has been called errorless learning. However, learners typically make some errors but the frequency of errors should decrease. Instructional prompts can be eliminated in small steps through gradually reducing prompts and time delay (Snell, 1978). Chart 9 depicts examples of gradually reducing prompts and time delay.

As illustrated in Chart 9, gradual prompt reduction involves systematically and gradually reducing the intensity or quantity of prompts. A time delay involves immediately providing the prompt after the cue to respond and then gradually delaying the time between the cue to respond and the prompt until the learner responds prior to the prompt. The gradual prompt reduction and prompt time delay strategies provide a means to change conditions in very small steps to transfer control of skill performance from prompts which already control skill performance to the desired conditions.

The printing example in Chart 10 illustrates how conditions and criteria change in gradual prompt reduction. The criteria for moving from one prompt level to the next is less stringent than the final performance criteria. This

CHART 9

Example of Reducing Instructional Prompts in Small Steps

1. Prompt Reduction

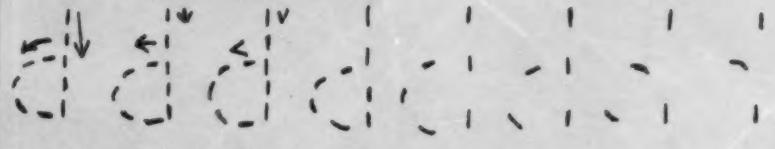
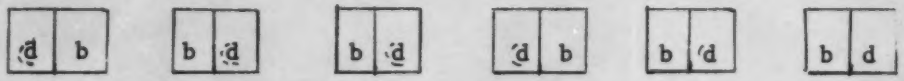
Skill/Task	Prompts	Cue to Respond	Prompt Reduction Sequence
Printing letters of the alphabet	Arrows and dotted lines	"Print the letters"	 10 dots 10 dots 10 dots 8 dots 6 dots 5 dots 4 dots 3 dots no dots reduce arrows reduce number of dots
Discriminate b from d when both letters are presented 29	Dots around circular stroke of d	Show me b Show me d	 reduce number of dots
Labeling sight words presented on flashcards 65	Teacher models response by saying "This word is ____"	"What is this word"	Teacher models word at regular word intensity; Teacher models word at slightly less than regular word intensity; Teacher loudly models word in a whisper; Teacher models word in barely audible whisper; No Model reduce intensity of model 66
Labeling objects	Teacher models response saying "This is a ____"	"What is this"	Reduce intensity of model using the same sequence employed in previous sight word example

CHART 9 Continued

Prompt Reduction

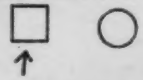
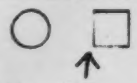
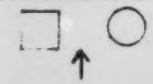
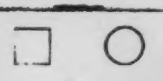
Skill/Task	Prompts	Cue to Respond	Prompt Reduction Sequence				
Imitates teacher clapping hands	Physical assistance. Teacher says "Do this". Models response and immediately provides physical assistance	"Do this" and models clap hands	Full hand over hand physical assistance	hand over wrist physical assistance	hand over forearm physical assistance	Touch elbows	No physical assistance
			Reduce amount of physical assistance				
Spoon feeding	Physical assistance	Plate of food and spoon	Assist learner to scoop food bring spoon to lips	Assist learner to scoop food bring spoon to 3 inches from lips	Assist learner to scoop food bring food to 12 inches from lips	Assist learner to scoop food	No Assistance
			Reduce physical assistance				
Spoon feeding	Physical assistance	Plate of food and spoon	Provide hand over hand assistance	Provde hand over wrist assistance	Provide hand over forearm assistance	Touch elbow to provide assistance	No Assistance
			Reduce physical assistance				
Comprehension of the word "square". A circle and a square are presented and the learner is asked to point to the square.	Gesture point. The teacher points to the correct item.	Teacher says "point to square"	Teacher touches square	 Teacher points behind square	 Teacher points towards middle of circle and square	 Teacher points in middle of circle and square	 No gesture cue
			Eliminate gesture cue				

CHART 9 Continued

Time Delay

Skill/Task	Prompt	Cue to Respond	Prompt Reduction Sequence				
Labeling sight words on flash-cards	Model - the teacher says "This is the word ____"	"What is this word"	The teacher says "What is this word" and immedi-ately models the correct response	The teacher says "What is this word" and waits 1 second before modeling the correct re-sponse	The teacher says "What is this word" and waits 2 seconds before modeling the correct re-sponse	Continue increasing the time delay in increments of 1 second until the time delay is a maxi-mum of 5 seconds	The teacher says "What is this" and the learner re-sponds prior to the model
Imitate teacher clapping hands	Physical assistance	Teacher says "Do this" and models clapping hands	The teacher says "Do this", models the response and immedi-ately physi-cally assists the learner	The teacher says "do this". Models the response and waits 1 second before providing physical assistance	The teacher says "Do this" Models the response and waits 2 seconds before provid-ing physical assistance	Continue increasing the time delay in increments of 1 second until the time delay is a maxi-mum of 5 seconds	The teacher says "Do this" and models clapping and the learner responds prior to being pro-vided physical assistance
Comprehension of the word "square" A square and a circle are pre-sented and the learner is asked to "Show me square"	Match to sample prompt. A square is held up over the circle/square and the learner can use the match to sample cue to determine the correct response	Teacher says "Show me square"	The teacher says "Show me square" and immediately presents the match to sample cue	The teacher says "Show me square" and waits 1 second before pre-senting the match to sample cue	The teacher says "Show me square" and waits 2 seconds before present-ing the match to sample cue	Continue increasing the time delay in increments of 1 second until the time delay is a maxi-mum of 5 seconds	The teacher says "Show me square" and the learner re-sponds prior to being pro-vided the match to sample cue

is done to eliminate the prompt as quickly as possible in order to reduce the possibility of learners becoming dependent upon the prompt.

The format depicted in Chart 11 may be used to translate a prompt reduction procedure into an instruction program. As depicted in Chart 11, the prompt reduction sequence is articulated in the antecedent event column of an instructional program format. Definitions of the correct responses go in the correct response column and the consequences for correct responses are delineated in the subsequent event column. The subsequent event column also articulates when to procede to the next prompt reduction step.

Error responses are defined in the error response column and the consequence for an error response is delineated in the subsequent event column. As illustrated in Chart 11, if the full prompt does not almost immediately produce consistent correct responding, the prompt must be increased or a different prompt must be employed. If the prompt does not control skill performance, it will not be possible to transfer control from the prompt to the desired conditions. The subsequent event column also articulates when to go back to the previous step. If, in progressing from one step to the next, errors occur, then the prompt level may have been reduced too abruptly and additional practice on the previous step may remediate the problem.

If errors continue to occur when, for example, progressing from step 4 to step 5 of a prompt reduction sequence, the problem may be that the prompt was

CHART 10

Example of Gradual Prompt Reduction

OBJECTIVE

Condition	Behavior	Criterion
Given a lined sheet of paper, a pencil and asked to "print a d"	the learner will print a d	with appropriate strokes on 9 out of 10 occasions across two sessions

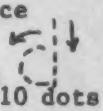
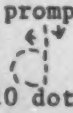
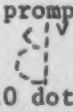
Changing Conditions	Behavior	Criterion
1. Given a lined sheet of paper, a visual prompt to trace  10 dots and asked to "print a d"	same	with appropriate strokes on 4 out of 5 occasions
2. Same as step 1 but visual prompt reduced  10 dots	same	same
3. Same as step 2 but visual prompt reduced  10 dots	same	same
4. Same as step 3 but visual prompt reduced 8 dots	same	same
5. Same as step 4 but visual prompt reduced 6 dots	same	same
6. Same as step 5 but visual prompt reduced 5 dots	same	same

Chart 10 (Continued)

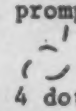
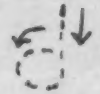
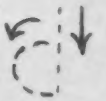
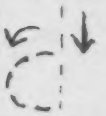
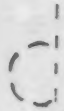
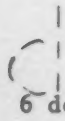
Changing Conditions	Behavior	Criterion
7. Same as step 6 but visual prompt reduced  4 dots	same	same
8. Same as step 7 but visual prompt reduced 3 dots	same	same
9. Same as step 8 but no visual prompt	same	with appropriate strokes on 9 out of 10 occasions across two sessions

CHART 11

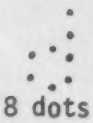
Sample Prompt Reduction Program Format

Skill - Printing

Antecedent Event	Correct Response	Subsequent Event	Error Response	Subsequent Event
1.  10 dots	Prints Correct "d"	Reinforce and after 4 correct "d's", go to next step	Incorrect "d"	After 10 incorrect "d's", increase prompt level or switch to another prompt
2.  10 dots	"	"	"	After three or more incorrect "d's" out of 10, go back to previous step
3.  10 dots	"	"	"	"
4.  8 dots	"	"	"	"
5.  6 dots	"	"	"	"
6. 5 dots	"	"	"	"
7. 4 dots	"	"	"	"
8. 3 dots	"	"	"	"
9.	"	Reinforce and after 9 out of 10 correct responses across two sessions, end program.	"	"

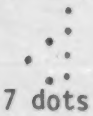
reduced too quickly. For example, in the printing program in Chart 11 the letter "d" was visually prompted by 8 dots in step 4. If, when progressing from step 4 to 5, the learner consistently made errors on step 5, a smaller prompt reduction step could be included between the steps.

Step 4:



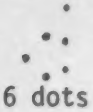
8 dots

Step 4a:



7 dots

Step 5:



6 dots

Time Delay

As previously articulated, a time delay procedure may also be employed to systematically eliminate prompts. A time delay procedure involves immediately prompting skill performance after the cue to respond. The time delay between the cue to respond and the prompt is increased in increments of one second. When the learner consistently responds correctly prior to the prompt, it has been eliminated. The flashcard reading example in Chart 12 illustrates how a time delay procedure may be used to change conditions in small steps to transfer control from the prompt to the desired conditions.

Many learners will respond prior to the response prompt before a 5-second time delay is reached. However, the time delay can be progressively reached beyond 5 seconds if after repeated trials learners do not respond before the prompt when a 5-second time delay is in effect.

CHART 12

Sample Time Delay Procedure

OBJECTIVE

Condition	Behavior	Criterion
When the teacher alternately presents three flashcard words and says "What is this word?"	the learner will read the flashcards	correctly within five seconds on nine out of ten trials across two consecutive sessions

Changing Conditions	Behavior	Criterion
1. The teacher alternately holds the three flashcards and says "What is this word?" and then immediately says (models) the correct response	same	correctly on two consecutive occassions
2. Same as step 1 except the teacher presents the model one second after the cue to respond	same	same
3. Same as step 1 except the teacher presents the model two seconds after the cue to respond	same	same
4. Same as step 1 except the teacher presents the model three seconds after the cue to respond	same	same
5. Same as step 1 except the teacher presents the model four seconds after the cue to respond	same	same
6. Same as step 1 except the teacher presents the model five seconds after the cue to respond	same	correctly within five seconds on nine out of ten trials across two consecutive sessions

The format depicted in Chart 13 may be used to translate a time delay procedure into an instructional program. As illustrated in Chart 13, the time delay is successively increased and the criteria for progressing from one time delay to another is articulated. If learners do not respond correctly in the first step of the time delay, the prompt does not control the response and either a different prompt must be selected or the learner taught to consistently respond to the prompts prior to continuing the delay procedure.

Although small step prompt reduction and time delay are very powerful teaching/learning procedures of last resort. Small step prompt reduction has the obvious disadvantage of requiring significant time and resources to design and construct the materials necessary to eliminate prompts in small steps. Both small step prompt reduction and time delay typically result in learners acquiring skills and making few or no errors in the skill acquisition process. However, an important part of learning is learning to detect and correct errors. We all make errors and learners who are not allowed to make errors and taught how to detect and correct errors can be at a significant disadvantage.

It is not possible to provide specific guidelines on when to use instructional prompts, correction prompts, or time delay. However, as a rule of thumb, it is reasonable to first try the procedure which is the easiest to implement and the least intensive. For example, first attempt to teach the skill through correction prompts or instructional prompts; if they are not effective, switch to either small step prompt reduction or time delay.

To summarize, changing conditions in small steps involves transfering control of a skill from a prompt which already controls skill performance to

CHART 13

Sample Time Delay Program Format

Skill: Sight words - flashcard reading

Antecedent Events	Correct Response	Subsequent Event	Error Response	Subsequent Event
1. The teacher alternately holds up three flashcards, says "What is this word" and immediately says (models) the correct response.	Learner says the correct word.	Reinforce after three consecutive correct responses. Proceed to next step.	Learner does not respond.	Change the prompt or reinforcer
2. Same as step 1 but with a one second time delay	"	"	"	After two consecutive errors, go back to previous step
3. Same as step 1 but with a two second time delay	"	"	"	"
4. Same as step 1 but with a three second time delay	"	"	"	"
5. Same as step 1 but with a four second time delay	"	"	"	"
6. Same as step 1 but with a five second time delay	"	"	"	"

the desired conditions. In order to use changing conditions in small steps strategy, there must be a prompt which consistently evokes the performance of the skill. As will be discussed in detail later, a combination of changing conditions and behavior in small steps procedure can be employed to progress in even smaller steps from skills an individual can perform to the performance of the desired skills. A topic which should be addressed prior to describing this procedure is prompt selection.

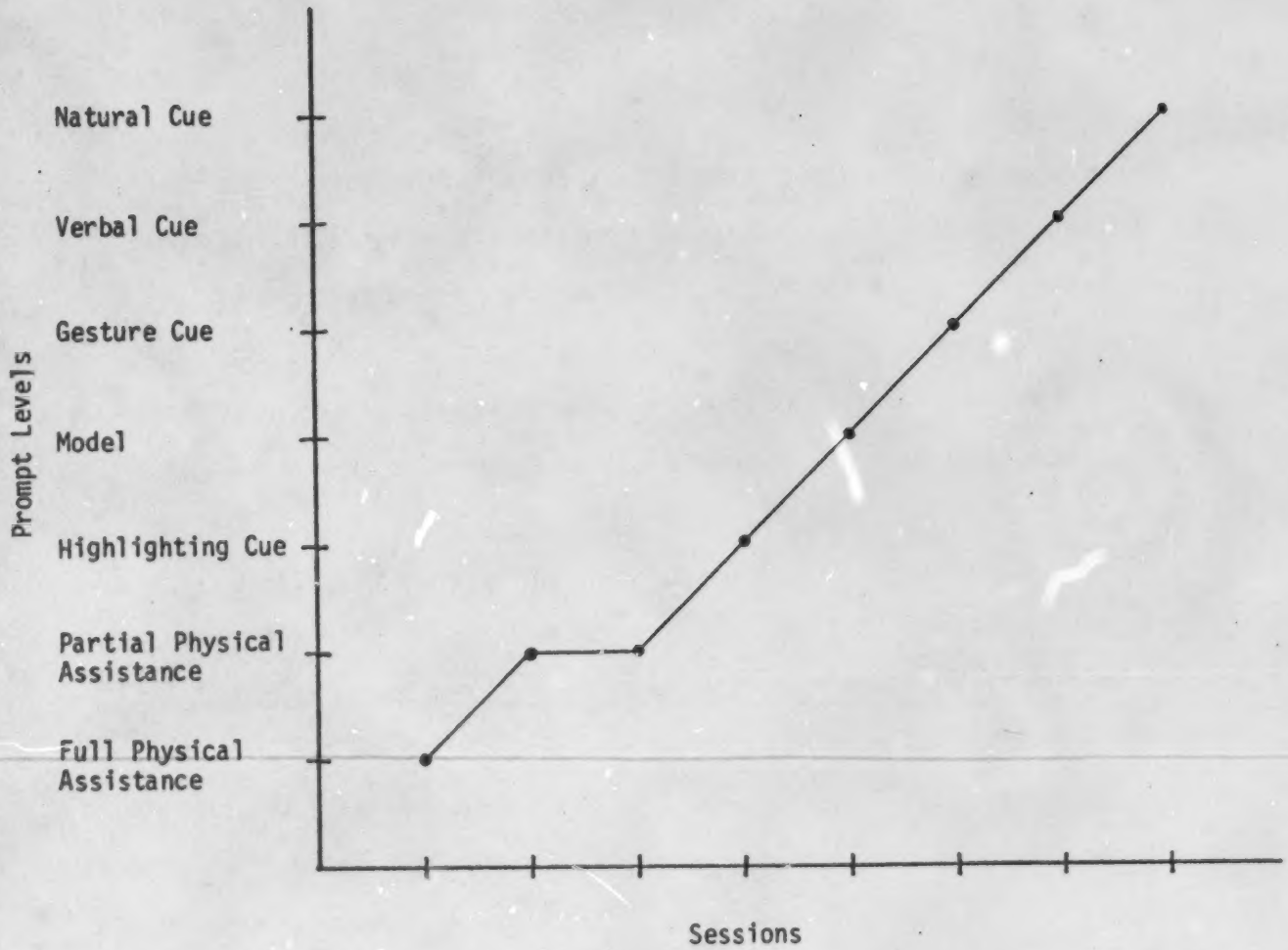
Prompt Selection

As previously articulated, there are a wide variety of different prompts from which to choose. At least three factors should be attended to in prompt selection: a) the prompt should consistently evoke the desired response; b) the prompt should be as unobtrusive as possible; and c) the prompt should be as instructionally convenient as possible. Obviously, the primary criterion for prompt selection is that the prompt must consistently evoke the desired skill.

Prompts may be conceptualized as existing in a hierarchy of least intrusive to most intrusive. Figure 6 illustrates the notion of a prompt hierarchy. As depicted in Figure 6, physical assistance is the most intrusive prompt and cues which control the behavior in the natural environment are the least intrusive. One goal of instruction should be to progress to less intrusive prompts over time. It is not possible to precisely rank the intrusiveness of all prompts. For instance, it is difficult to determine if a gestural, model, or highlighting prompt is more intrusive. However, the basic notion is to select the least intrusive prompt which consistently evokes the skill of concern.

FIGURE 5

Sample Prompt Hierarchy



An essential consideration in prompt selection is instructional convenience. As used here, instructional convenience refers to how efficiently the prompts can be used for instructional purposes. For instance, learners could be taught to print by providing them with hand-over-hand physical assistance and then gradually eliminating it. However, physical assistance is very intrusive and requires that learners be provided one-to-one instruction. Thus, although physical assistance may consistently evoke the skill of concern, it would not be the prompt of first choice. It would be more instructionally convenient to teach printing through commercially available workbooks, which provide dots to prompt printing and then systematically eliminate the dots.

A problem frequently encountered in instructing hard to teach learners is that they often do not readily learn from instructionally convenient prompts. Most classroom instruction is accomplished through instructionally convenient verbal cues, reading written cues, and models. Indeed, most instruction in nonclassroom environments utilizes these prompts. For example, a supervisor training a new employee will typically either verbally describe, provide written instructions and/or model the job and then expect the trainee to perform with minimal correctional feedback. Learners should more efficiently acquire new skills in school and nonschool environments if they can acquire skills through instructionally convenient prompts. We should set two goals for difficult to teach learners: a) to teach them relevant skills, and b) to teach them to learn from instructionally convenient prompts.

Chart 14 provides several examples of transferring control of a skill from prompts which already consistently control a skill to instructionally convenient prompts. As illustrated in Chart 14, the prompt reduction or time delay strategies may be employed to bring performance of a skill under the control of instructionally convenient prompts.

CHART 14

Bringing Skill Performance Under the Control of Instructionally Convenient Prompts

Skill	Prompt which consistently evokes skills	Instructionally convenient prompt	Transfer of control strategy
Print letters	Physical assistance	Dotted lines	Use prompt reduction to transfer control from physical assistance to dots
Reading phonetically regular words	Model sounding out word (e.g.,mmmaann) and then saying it fast	Sounding out unknown words without a model prompt	Use a time delay procedure to transfer control from a model to the presence of an unknown word
Dressing	Physical assistance	Model	Use a time delay or prompt reduction procedure to transfer control of the motor movements involved in dressing from a physical assistance to a model prompt

It cannot be overemphasized that prior to using instructionally convenient prompts, we must first assess learners to insure that instructionally convenient prompts consistently evoke the skill of concern. If an instructionally convenient prompt does not consistently evoke the skill, then we must either use a less instructionally convenient prompt and/or teach the learners to consistently respond correctly to the instructionally convenient prompt.

Typically, assessments of learners are primarily concerned with what skills they do and do not perform. Although such assessments provide educationally relevant information for pinpointing what skills learners should be taught, they do not provide information on how to teach the skills. Once skills learners should be taught are pinpointed, a second level of assessment should be performed to determine what prompts can be employed to teach the skills.

Changing Behaviors in Small Steps

As previously articulated, small step training can also be accomplished by changing behaviors in small steps. Chart 15 depicts how selected skills can be broken into small steps.

The definition of a skill or behavior is arbitrary. For example, the ability to drive a car can be considered one skill. However, this skill can be broken into numerous subskills such as starting, stopping, shifting, parking, and backing up. Obviously, each of the subskills can be broken into further subskills. For instance, starting involves putting the key into the ignition,

CHART 15

Breaking Selected Behaviors into Small Steps

Behavior	Read 90 Survival Words	Trace Letters of Alphabet	Read Second Grade Basal Reader
Small steps	1. Read 10 survival words 2. Read 20 survival words 3. Read 30 survival words . . . 9. Read 90 survival words	1. Trace — 2. Trace / 3. Trace C 4. Trace ↄ 5. Trace 3 letters 6. Trace 6 letters . . . 12. Trace 26 letters	1. Read preprimer 2. Read 1st book of 1st grade reader . . . 6. Read 1st book of second grade reader
Behavior	Count to 100	Put on Hat	Imitate 21 Functional Motor Movements
Small steps	1. Count to 10 2. Count to 20 . . . 10. Count to 100	1. Pick up hat 2. Open hat 3. Place on head 4. Pull down on head	1. Imitate 3 movements 2. Imitate 6 movements 3. Imitate 9 movements 4. Imitate 12 movements . . . 7. Imitate 21 movements
Behavior	Janitoral - Clean bathroom	Make change for a dollar	Roll over back to stomach
Small steps	1. Clean sink 2. Clean Mirror 3. Wash floors . . . 20. Change toilet paper	1. Count by ones to 100 2. Count pennies 3. Count by fives 4. Count nickels . . . 70. Make change for a dollar	1. Reaches across body with one arm 2. Turns head to the same side 3. Flexes top leg up and across body 4. Rolls onto side 5. Rolls onto stomach 6. Frees arms

putting the car in park, turning the key, stepping on the accelerator, etc. We shall refer to the process of breaking skills into small subskills as component analysis. Once a skill has been broken into subskills, they can be sequenced from easy to hard or from simple to complex to form a skill sequence.

The power of a skill sequence approach is that skills or behaviors can be broken into very small teachable units. A skill sequence is similar to a number line in that a subskill (number) can usually be inserted between any two subskills (numbers). As a rule of thumb, the more handicapped the learner, the finer the breakdown of skills within the sequence must be to facilitate efficient learning. There are at least three bases for component skill analysis: a) curriculum, b) grouping, and c) task analysis.

A curriculum basis for component skills analysis involves using the skill sequences that are the basis of commercially available curricula. Most commercial reading, math, language/communication, motor, self-care, etc. curricula specify in what order the skills will be assessed and taught. The first step in performing a component analysis is to review available curricula to ascertain how the skills are sequenced, and if the skill sequence meets the needs of individual learners. If it does, use the skill sequence. Skill sequences delineated in curricula for nonhandicapped learners are generally an appropriate framework for assessing and instructing handicapped learners. However, the skills in the sequence are typically not broken into small enough subskills to make them maximally effective with handicapped learners. As illustrated in Chart 16, the skills within the sequence may be broken into further subskills.

CHART 16

Further Skill Breakdown of Skills

From a Hypothetical Curriculum

Skill	Counts to Five	Labels Short Vowel Sounds (a,e,i,o,u)
Breakdown	1. Counts to 1 2. Counts to 2 3. Counts to 3 4. Counts to 4 5. Counts to 5	1. Labels 'a' 2. Labels 'e' 3. Labels 'a' and 'e' 4. Labels 'i' 5. Labels 'a', 'o' and 'i' . . . 9. Labels 'a','e','i','o','u'
Skill	Phonetically Sound Out CVC (consonant vowel consonant) words	Eats With Spoon
Breakdown	1. Sounds out VC (vowel consonant) words 2. Sounds out CV (consonant vowel) words 3. Sounds out CVC words	1. Eats finger foods 2. Holds spoon 3. Brings food from lips into mouth 4. Brings food from within 3" of mouth into mouth 5. Brings food from 1" of mouth into mouth 6. Scoops food and puts into mouth

Although the skill sequences for nonhandicapped learners encompassed by commercially available curricula are generally appropriate for handicapped learners, the curricula are typically not maximally effective with handicapped learners for at least three reasons: a) they are not broken into fine enough sequences of subskills, b) they do not teach skills to an acceptable criterion prior to advancing to instruction on the next skill, and c) they may use instructional prompts such as written cues and complex models which may not consistently evoke correct skill performance by handicapped learners.

Typically, commercially available curricula, except for a few developed for handicapped learners, are lesson-based, instead of criterion-based. For example, a curriculum may have six lessons (consisting of six drills and eight workbook pages) on consonent-vowel-consonent (cvc) words or three lessons (consisting of ten drills) on counting to ten. After completing the lessons, the learners advance to the next skill in the sequence. Some learners who have not acquired the skill will advance after so many lessons just because the curriculum provides for no more lessons or practice on the skill. Such learners will fall further and further behind, because the curriculum does not require and teach learners to meet an acceptable criterion prior to advancing to another skill. The curriculum has programmed certain learners to fail. Such curricula seemingly create handicapped learners through not insuring that all learners acquire specific skills prior to advancing to the next skill in the sequence.

Task analysis is a process which can be employed to develop and adapt skill sequences. Prior to performing a task analysis, an educational objective must be formulated. Once the educational objective has been formulated, task analysis may be used to derive the component skills involved in the educational objective. A task analysis may be accomplished by reviewing how available

curricula break down the skill of concern, performing the skil and/or observing someone else performing the skill and carefully noting the sequence of steps involved and/or repeatedly asking the question "What skills are required to accomplish this task?" until no more subskills can be derived. Chart 16 illustrated how selected skills could be broken down through the process of task analysis.

Grouping is a component analysis strategy which involves dividing large blocks of behaviors into small units to make them easier to teach and learn. All of us can probably remember having to memorize poetry in school. A common strategy for memorizing poetry is to break the poem into units and to memorize one unit at a time. Poems can typically be broken into lines or stanzas. Four strategies for memorizing a poem are illustrated in Chart 17.

As depicted in Chart 17, poems can be broken into very small units to facilitate memorization. Highly skilled individuals can learn things presented in large units. Typically, the more handicapped a learner is, the smaller the units have to be. There are innumerable ways to break behaviors into small groups for instructional purposes. Chart 18 illustrates a few ways. There is no conclusive evidence which indicates that one method of grouping behavior is more effective than another. However, as a rule of thumb, the more difficult to teach the learner is, the smaller the groups should be.

When we change behaviors in small steps, the conditions typically have

CHART 17

Four Selected Strategies for Memorizing a Poem

Strategy A	Strategy B	Strategy C	Strategy D
1. Memorize 1st line	1. Memorize 1st line	1. Memorize the 1st stanza	1. Memorize the 1st stanza
2. Memorize 2nd line	2. Practice 1st line while memorizing the 2nd line	2. Memorize the 2nd stanza	2. Practice the 1st stanza while memorizing the 2nd stanza
3. Practice 1st and 2nd lines	3. Practice 1st and 2nd lines while memorizing the 3rd line	3. Practice the 1st and 2nd stanzas	3. Practice the 1st and 2nd stanzas while memorizing the 3rd stanza
4. Memorize 3rd line	. . . .	4. Memorize the 3rd stanza	. . . .
5. Practice 1st, 2nd and 3rd lines	Continue until the entire poem is memorized	5. Practice the 1st, and and 3rd stanzas	Continue until the entire poem is memorized
. . . .		. . . .	
Continue until the entire poem is memorized		Continue until the entire poem is memorized	

CHART 18

Breaking Selected Behaviors into Small Groups

Behavior: Forty Basic Math Facts

Strategy A	Strategy B
1. Teach 1st fact 2. Teach 2nd fact 3. Practice 1st and 2nd fact 4. Teach 3rd fact 5. Practice 1st, 2nd and 3rd fact . . . Continue until all math facts are learned	1. Teach 1st five math facts 2. Practice 1st five facts while teaching 2nd five 3. Practice 1st ten facts while teaching 3rd five . . . Continue until all math facts are learned

Behavior: Toothbrushing (1. pick up toothbrush; 2. pick up tooth paste; 3. put toothpaste on brush:... 20. put toothbrush and paste away)

Strategy A	Strategy B	Strategy C	Strategy D
1. Teach Step 1 2. Teach Step 2 3. Practice Steps 1 & 2 4. Teach Step 3 5. Practice Steps 1, 2, & 3 . . . Continue until all steps are learned	1. Teach 1st step 2. Require 1st step be performed before teaching second step . . . Continue until all steps are learned	1. Teach 1st five steps 2. Teach 2nd five steps 3. Practice 1st ten steps 4. Teach 3rd five steps 5. Practice 1st fifteen steps . . . Continue until all steps are learned	1. Teach all steps concurrently but provide additional practice on difficult steps

Behavior: Making change for a dollar (1. Count by ones; 2. Count pennies; 3. Count by fives ... to make change for a dollar)

1. Teach Step 1 2. Teach Step 2 while practicing Step 1 3. Teach Step 3 while practicing Steps 1 & 2 . . . Continue until all steps are learned	1. Teach 1st five steps 2. Teach 2nd five steps while practicing 1st five . . . Continue until all steps are learned

to change. For example, when progressing from one set of addition facts to another, or from cleaning the sink to cleaning the floor, or from reading cv words to reading cvc words, different task materials have to be presented as well as different cues to respond. When both conditions and behaviors are changed in small steps, we have a mixed paradigm.

Changing Both Conditions and Behaviors in Small Steps

Generally, it is advantageous to simultaneously change both conditions and behaviors in small steps. An initial step in designing a direct instructional program is to define what will be taught in observable, measurable terms. That is, a behavioral objective is formulated. The behavioral objective defines what skill will be taught but does not define how to teach it.

Once a behavioral objective has been formulated, component analysis can be employed to break the skill into component parts and to generate a skill sequence which progresses in easy to hard or simple to complex steps to the acquisition of the objective. The skill sequence or sequence of small behavior changes defines "what" to teach in which order to facilitate learners obtaining the behavioral objective. The sequence does not delineate how to teach the skills, it only defines the order in which they will be taught.

After generating the skill sequence, a next step is to design an instructional prompt and/or a correction prompt procedure for teaching each step of the skill sequence. A direct instructional program generated by this process could be formulated as illustrated below:

Objective

Conditions:	Behavior:	Criterion:
When given a sheet of lined paper and asked to "print the alphabet"	The learner will print the letters	Within one minute with 95% of the letters considered accurate by the teacher and learner.

Component Analysis

1. Teach the learner to print 3 letters.
2. Teach the learner to print 3 additional letters while practicing acquired letters.
3. Teach the learner to print 3 additional letters while practicing acquired letters.
4. Teach the learner to print 3 additional letters while practicing acquired letters.
5. Teach the learner to print 3 additional letters while practicing acquired letters.
6. Teach the learner to print 3 additional letters while practicing acquired letters.
7. Teach the learner to print 3 additional letters while practicing acquired letters.
8. Teach the learner to print 3 additional letters while practicing acquired letters.
9. Teach the learner to print 4 additional letters while practicing acquired letters.

Instructional Sequence

1. Teach the learner to print 3 letters.
   - 1.1 Teach the learner to connect 9 dots which represent each letter.
   - 1.2 Teach the learner to connect 7 dots which represent each letter.
   - 1.3 Teach the learner to connect 5 dots which represent each letter.
   - 1.4 Teach the learner to connect 3 dots which represent each letter.
   - 1.5 Teach the learner to print the letters without the aid of the dots.
2. Teach the learner to print 3 additional letters while practicing acquired letters.
   - 2.1 - 2.5 Follow the same sequence of steps as in Step 1. Continue to add additional letters in the same manner.

As indicated by the example, a combination of changing conditions and changing behaviors in small steps can lead to a very small step instructional sequence. Using the procedures discussed previously, the sequence could be refined into even smaller steps and alternative prompts could be used singularly or in combination. Such small step instructional sequences may seem laborious and extreme. However, they provide an effective means of structuring the educational environment for difficult to teach learners. It must be re-

emphasized that the employment of such small step programming is generally only necessary when typically used programming strategies have been demonstrated to be ineffective.

Generating small step programming is made easier when curricula with such small step programming are adopted. When selecting curricula we should carefully assess if they provide for small step programming and if the prompts and programming they employ can be readily modified to meet the needs of individual learners. As previously discussed, small step programming can also be achieved by changing criteria in small steps.

Changing Criteria in Small Steps

Learners are typically placed into special education programs because they have not experienced success and achievement in the "regular" learning environment. For such learners, school is often a negative environment. Because they have not experienced much success, they may not be motivated to learn. It is essential to provide such learners with almost immediately successful learning xperiences. The changing criteria and behaviors in small steps procedures can provide such an environment. In addition, the criterion for successful performance can be lowered to the learner's current performance level to insure immediate success. Once the learner has experienced success, the criterion can be gradually increased to an acceptable level.

The criterion component of a behavioral objective articulates the rate, duration, percent correct, etc. a skill must be performed at for a learner to have acquired the skill. Chart 19 depicts selected examples of a gradually changing criterion. The actual steps in changing a criterion should be based upon assessment of individual performance. For example, if an individual reads an average of 20 cvc (consonant-vowel-consonant) words per minute, the first changing criterion step would be set at 20 to insure success. Once this

criterion is met, the learner's average rate is recalculated. If the average rate is 27, the next step could be set just above the average at, for instance, 30. Once the new criterion is met, the average rate is recalculated and a new criterion set. We can continue in this manner until the desired criterion is met.

Small step training is a powerful direct instruction strategy. There are innumerable ways to change conditions, behaviors, and criteria in small steps. There are no pat answers as to when specific strategies should be employed. However, decisions on what strategy to employ should be made on the basis of an error analysis.

Error Analysis

Direct instructional procedures should be derived to meet the needs of individual learners. Although we may have the same basic educational objectives for all learners, the way they are taught the skills encompassed by the objectives should be based upon a careful assessment of individual learning styles and instructional needs. As previously discussed, direct instruction can be individualized by: a) using instructional and correction prompt procedures which are based upon prompts which are effective with individual learners, b) breaking the behaviors to be taught into small units, and c) gradually changing the performance criterion. When learners do not make adequate progress in a direct instruction program, we should determine why progress is not adequate and make systematic adjustments in the program.

An initial step in modifying an instructional program is to determine what types of errors learners are making and to develop and implement pro-

CHART 19

Selected Example of Changing Criterion

	Rate	Duration	Percent Correct
Behavior	Completion of addition fact problem	Head Control maintain head proper position	Reading 20 sight words
Desired Criterion	40 problems correct per minute	Maintain Head control control for 5 minutes	100% correct
Criterion Steps	1. 10 per minute 2. 20 per minute 3. 30 per minute 4. 35 per minute 5. 40 per minute	1. 20 seconds 2. 40 seconds 3. 1 minute 4. 2 minutes 5. 3 minutes 6. 4 minutes 7. 5 minutes	1. 25% correct 2. 50% correct 3. 75% correct 4. 100% correct
Behavior	Head Banging	Running	Assembling 50 Widgits
Desired Criterion	No Head Bangs	Run for 20 minutes	100% correct
Criterion	1. 40 head bangs per day 2. 35 head bangs per day 3. 30 head bangs per day 4. 20 head bangs per day 5. 15 head bangs per day 6. 10 head bangs per day 7. 0 head bangs per day	1. 5 minutes 2. 7 minutes 3. 10 minutes 4. 15 minutes 5. 20 minutes	1. 25% correct 2. 50% correct 3. 75% correct 4. 100% correct

cedures to directly remediate the errors. There are at least three general types of errors learners can make; performance, discrimination, and response deficit errors.

Performance Errors

As used herein, errors can be said to be the result of a performance problem when learners have demonstrated that they know what skill they are expected to perform and can perform the skill, but do not perform the skill or perform the skill incorrectly. For instance, learners who have demonstrated that they can sound out cvc words, dress themselves, eat with a spoon, or make change for a dollar, but do not consistently perform the skill appropriately, demonstrate a performance problem.

Performance problems typically occur because the direct instruction routine does not motivate learners to consistently perform the desired skills. As previously discussed, we can systematically change either the events which precede skill performance (antecedent events) and/or the events which follow skill performance (subsequent events) to facilitate skill performance.

Performance problems can be the result of instructional routines being dull and boring or too drawn out. One way to make the instructional routine more motivating is to change antecedent events. Antecedent events can be modified by using different instructional materials and/or using a fun game format for presenting instruction. For example, reading can be taught through high interest reading materials; dressing taught through dress-up play; and language, reading, math skills, etc. can be taught through games and races. In some cases, performance problem errors occur because instructional routines are too drawn out. For example, a program may be scheduled into a twenty minute period. If data on learner performance indicate that learners perform better at the beginning of the period than at the end, the instructional period

is probably too long. One solution to this problem is to break instruction into two ten-minute periods of four five-minute periods which occur at different times of the day. In other words, instruction on a specific skill is distributed. The time periods between distributed instruction on specific skills can vary from a few minutes to hours. For instance, if the skill being taught is math facts, five minutes could be spent on a math facts drill, the next five minutes could be spent on counting skills, then five more minutes could be spent on another math fact drill, etc. Instruction could also be more distributed. A ten-minute math fact drill could be provided early in the morning and another drill could be provided several hours later in the day.

A special type of performance problem involves learners who do not respond or infrequently respond. For this type of problem, an error analysis should be conducted to determine whether the learner can perform the task but doesn't, or if the learner does not know how to perform the task. It is the author's experience that educators frequently count no responses as error responses. Use of this convention can hamper the error analysis. For instance, let's say a learner is given ten math problems and completes three correctly but does not attempt the other seven. If no responses are counted as errors, the percent correct is thirty. This percent correct erroneously indicates that the learner does not know how to perform the task when in actuality the learner achieved one hundred percent correct on problems attempted. Other learners perform tasks attempted incorrectly. Such learners demonstrate both a performance problem and a learning deficit.

Both the subsequent events for correct and error performance can be modified to remediate a performance problem. Events which follow behavior and are contingent upon the occurence of the behavior can either cause the be-

havior to increase, decrease, or be neutral (neither increase or decrease the behavior). Events which increase behaviors are called reinforcers and events which decrease behaviors are called punishers. For example, if praising a learner for correct responses results in an increase in correct responses, praise is functioning as a reinforcer. On the other hand, if praise does not produce an increase in correct responses, it is neutral and if it decreases correct responses, it is a punisher.

Positive events such as praise, grades, stars, money, and free time are not necessarily reinforcers. In order for a positive event to be a reinforcer, it must be empirically demonstrated that the event increases behaviors. For some individuals, positive events such as praise, grades, stars, and money do not function as reinforcers. Consequating behavior performance with such events will not increase behavior.

If a learner can perform a skill and does receive a positive consequence for skill performance but skill performance does not increase, then we can assume that the positive event is not functioning as a reinforcer. In such cases we can change the positive event which follows correct behavior performance until an event which increases the behavior is found.

There are at least three basic procedures for identifying potentially reinforcing events. The simplest method involves asking the learners what they would like to earn for correct behavior performance. A contract can be made with the learners delineating that if they perform specified behaviors at an acceptable criterion, they will receive a particular reinforcer such as praise, a star, a grade, a note to parents, free time, etc.

A second strategy for delineating potential reinforcers is to observe what activities learners frequently engage in when they have a free choice. For example, in a free choice situation learners may read a book, play with

a favorite car, talk to the school secretary, put together a puzzle, or play with a classmate. Activities in which learners frequently engage in free choice situations are potential reinforcers. We can make engaging in the activities contingent upon performing specified behaviors at an acceptable criterion.

The third procedure which may be employed is called reinforcement sampling. This procedure involves presenting learners with many different events such as personal attention, free time, games, and toys, and observing which stimuli they interact with and for how long. Events which they frequently interact with for relatively long durations of time are potential reinforcers and can be used as contingent consequences for the performances of specified behaviors.

Events are not consistently reinforcing. It is not uncommon for people to sometimes prefer tea to coffee or playing bridge rather than Scrabble. Learners' preferences for events may also vary. Unless a particularly powerful reinforcement is found, it is wise to employ a reinforcement menu. Use of a reinforcement menu involves making a variety of potential reinforcers available from which learners can choose. For example, learners may be allowed to choose between two favorite games or toys during free time as a consequence for performing skills at a specified level.

When learners are initially acquiring new skills it is advantageous to reinforce them frequently. The reinforcement provides immediate feedback on their performance. As previously discussed, the instructional program should be designed such that learners are immediately successful and can thus obtain access to reinforcement.

Reinforcers are events which immediately follow specified behaviors and result in the increase in those behaviors. Instructional correction follows

incorrect behavior performance and usually consists of additional teacher attention. Teacher attention may be reinforcing and learners may receive more teacher attention for incorrect than correct skill performance. This is particularly likely to occur when little reinforcement or teacher attention is provided for correct skill performance. In the case of performance problems we should is insure that more teacher attention is provided for correct responses than error responses. As defined above, a performance problem exists when learners can perform the skill. Thus, learners really do not need instructional correction. Generally, an effective strategy for performance problems is to ignore errors (provide no correction) and to reinforce correct skill performance.

Discrimination Errors

Error responses can occur because learners do not attend to the task, do not discriminate task-relevant stimuli, do not differentiate what type of response to make, and/or cannot perform the correct response. Each type of error, except for the inability to perform the correct response, may be considered a discrimination error. Errors due to an inability to perform the correct response will be discussed in the next section.

As a rule of thumb, errors can be attributed to discrimination errors when learners' error responses are equal to or greater than correct responses. Discrimination errors occur when learners do not understand the task. Lack of understanding the task can also produce performance problems. That is, learners may stop responding and/or engage in inappropriate behaviors to avoid or escape tasks in which they are not successful and thus do not obtain sufficient reinforcement for appropriate skill performance. However, unlike performance problem errors, discrimination errors generally cannot be remediated by only using more powerful reinforcers. Appropriate instructional prompts

and/or correction prompts must be employed to teach the task such that learners can gain access to success and reinforcement.

When learners do not respond or engage in inappropriate behaviors to avoid or escape tasks they do not understand, they may engage in superstitious or gambling behaviors. Whether individuals have been labeled gifted or severely/profoundly handicapped they may engage in either behaviors to escape or avoid a task they do not understand, or gambling. When gamblers are involved in games of chance, they do not respond randomly. They use a system and will modify their system until they derive one which appears to result in the maximum payoff. Systems typically do not result in gamblers winning every time but they do facilitate gamblers winning often enough to continue playing the game. When learners do not understand a task the task can become a game of chance. The learners do not know what response will result in a payoff every time and may employ a system that results in enough payoffs to make it worthwhile for them to engage in the task.

We will use a two-choice discrimination task as an example. The teacher places a spoon and a cup in front of the learner and alternately asks the learner to "Touch the spoon" and "Touch the cup." In order to win the game the learner has to discriminate between the words "cup" and "spoon" and the objects "cup" and "spoon." In addition, the learner has to understand or learn that when the teacher says "cup" touching the cup is paid off, and when the teacher says "spoon" touching the spoon is paid off.

Let's say the learner does not understand the rules of the game. The learner does not understand that the verbal cue of "Touch the spoon/cup" provides the information necessary to make a correct response. The learner does not attend to the component words of verbal cue. The verbal cue is a "go signal." The learner knows if he/she touches one of the objects after the cue that re-

inforcement will periodically be delivered. Instead of using or learning the rule "Touch the object named" the learner develops his/her own rules or system of responding.

Some of the systems used by learners in such situations are win-stay/lose-shift, always touch the object on the right or on the left, always touch the spoon or the cup, or always touch the object at which the teacher is looking. Win-stay/lose-shift involves the learner touching the same object again if he/she received reinforcement on the last try (win-stay) and touching a different object if no reinforcement was delivered (lose-shift). In a two-choice task, each of these systems can result in at least fifty percent of the learner's responses being correct and thus paid off. For many learners this reinforcement level is sufficient to maintain their game-playing behavior. Unless the teacher changes the instructional routine to facilitate the learner acquiring the correct rules for playing the game, the teacher and learner could theoretically go on playing the game forever without the learner ever acquiring the correct rule or meeting the skill acquisition criterion. In fact, if the game is played long enough the learner could meet the skill acquisition criterion by chance. Difficult to teach learners, whether they are mildly or profoundly handicapped, often engage in very complex gambling strategies. The strategies may be very ingrained and difficult to eliminate.

Another gambling strategy is impulsive responding. As used herein, impulsive responders are learners who respond quickly on the basis of their own gambling strategies without even attempting to discern or learn the correct rules for playing the game. Impulsive responders are difficult and frustrating to teach unless appropriate instructional procedures are used. An impulsive responder may touch an object choice in the two-choice discrimination task before the teacher cues him/her to "touch the cup/spoon", guess at reading words

without attempting to employ word attack skills, and complete a math fact work sheet using his/her own methods; ignoring the directions provided by the teacher.

One objective of direct instruction is to teach learners to use the appropriate rules for playing the game and to eliminate the use of inappropriate gambling strategies. Either deductive or inductive instructional procedures may be used to teach learners to use appropriate rules. The deductive approach involves providing the learner with the rule and teaching the learner to apply the rule across multiple problems of a given type until the learner generalizes the rule across untrained problems of a given type. (See Chart 20 for example tasks.)

One of the rules for phonetically sounding out words is "sound it and say it fast". To teach the rule, learners can be presented multiple examples of vc words (vowel-consonant words such as "at"). The learner can be required to state the rule before sounding out each word and saying it fast. An instructional sequence for accomplishing this could be designed as follows.

Phase I: Teaching learners to sound out vc words when the rule is prompted by the teacher.

Step 1: Teach words "at", "it", "up", "et"

Teacher cue: Points to the words and ask "what is the rule?"

Learner response: "Sound it out and say it fast."

Teacher cue: "Do it."

Learner response: "aaat", "at"

Step 2: Test untrained words "el", "ut", "op", "ic"

Chart 20

Examples of Tasks for Inductive and Deductive Instruction

Skill	Training Tasks	Untrained Generalization Test Tasks
Count from 1 to 5 objects	Count 1 to 5 pencils Count 1 to 5 marbles Count 1 to 5 pennies	Count 1 to 5 blocks Count 1 to 5 cups Count 1 to 5 spoons
Concepts of big and little	Label big and little balls Label big and little cars Label big and little wagons	Label big and little pencils Label big and little cups Label big and little sticks
Concepts of car and wagon	Label red car and blue wagon Label yellow car and yellow wagon Label white car and red wagon	Label blue car and orange wagon Label green car and white wagon Label yellow car and brown wagon
Count out money up to one dollar	Count out 35¢ Count out 86¢ Count out 55¢ Etc.	Count out 13¢ Count out 81¢ Count out 99¢ Etc.

Phase II: Teaching learners to sound out words when the rule is not prompted by the teacher.

Step 1: Teach words "at", "it", "up", "et"

Teacher cue: Points to word and asks "what is this word?"

Learner response: "Sound it out and say it fast.

Step 2: Test untrained words "el", "ut", "op", "ic"

Phase III: Teaching learners to sound out words without stating the rule.

Step 1: Teach words "at", "it", "up", "et"

Teacher cue: Points to words and asks "What is this word?"

Learner response: "aaat", "at"

Step 2: Test untrained words "el", "ut", "op", "ic"

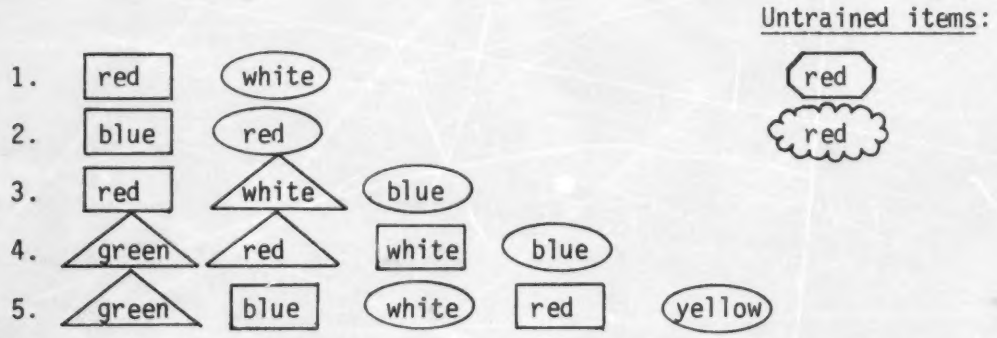
As delineated in the example the strategy insures that the learner uses the appropriate rule by initially having the learner state the rule prior to responding. Once the learner consistently states the rule prior to responding and solves the problems correctly across untrained vc words, the learner is allowed to solve the problems without first stating the rule. When the learner consistently applies the rule correctly across many untrained vc words the rule has been learned. If the learner does not apply the rule to untrained words, more words should be trained until generalization occurs. The learner can now be taught to apply the rule across different types of related problems, such as cv, cvc, ccvc, and cvcc words.

A problem with the deductive method of teaching is that learners must comprehend the components of the rule for the method to be effective. That is, the learners would have to demonstrate that they comprehend "sound it out" and "say it fast" prior to teaching them to apply the rule. Comprehension of the rule can of course be taught through "sound it out" and "say it fast" games and drills. However, the deductive teaching approach will not be effective for learners who do not comprehend language or when the rules are complex. In such cases an inductive instructional method should be more effective.

Let's say the task is to teach learners to discriminate between a square and a circle. The rules could be "If it is a rectangle with all sides equal it is a square and if it is round it is a circle." The teacher could alternately present a circle or square and ask "what is this?" The learner could then look at the circle or square, say the rule, and then say "circle" or "square". In order to apply the rule the learner would have to comprehend the words "rectangle", "sides", "equal", and "round".

For another example, let's say our objective is to teach learners to discriminate red from blue. The rule could be "If the color is between green and violet, it is blue; if it is between moderate orange and russet, it is red." Learners who comprehend the words "color", "green", "between", "violet", "moderate", "orange", and "russet" could learn the colors red and blue by the deductive approach. However, the inductive approach can be used to teach the rule to learners who lack the language comprehension skills.

The inductive method involves teaching learners multiple examples of a class of problems. When the learners demonstrate that they can solve untrained problems of the class, we can infer that they learned the rule through induction. For instance, to teach the color red, the following instructional sequence could be employed.



To teach the learner to discriminate red, the teacher would start at step one, present the red and white items and ask the learner to "touch red." The learner would be reinforced only for touching red. Once the learner responces were consistently correct, the teacher would advance to the next step. The shape of the colored items and their positions are varied to insure that the learner is responding on the basis of color instead of shape or position. Two untrained red shapes are introduced at the completion of the sequence to test for rule generalization. (See Chart 2 for more examples of tasks.)

If the learner passes the generalization test, we can infer that the learner has acquired and can apply the rule although the learner will probably be unable to state the rule. Both the inductive and deductive teaching methods infer that the learners have acquired the rules when they consistently apply the rules to untrained test items.

When designing direct instructional programs, it is essential to analyze what rules will be taught and then to delineate either a deductive or inductive method for teaching and testing learner rule use. In addition, learners' errors during skill acquisition should be carefully analyzed to determine if they are basing their responses upon the appropriate rules or if they are using a gambling system.

One powerful procedure for eliminating gambling systems is to design instructional programs such that learners will make no or few errors. The instructional prompt procedures articulated previously can be employed to inhibit error responses. Explicit instructional prompts should facilitate learners understanding the task and inhibit the use of gambling and/or task escape and avoidance strategies.

Types of Discriminating Errors

A direct instruction format usually encompasses the following sequence:

1. Secure learner attention
2. Secure learner attention to task relevant stimuli
3. Cue learner to perform skill
4. Learner responds

Learners can make errors because they do not attend to the task, do not attend to task relevant stimuli, do not differentiate what type of response to make and/or cannot perform the desired response. Attention to task relevant stimuli can be facilitated by stimulus prompts. Differentiating the type of responses to make can be facilitated by response prompts and an inability to perform the correct response may be remediated by changing behaviors in the small steps procedures discussed previously. Chart 21 illustrates the basic direct instructional format and selected error remediation procedures.

As already described, prompts used in error remediation have to be individualized to meet learner needs. In addition, the remedial prompts can be presented as instructional or correction prompts. As depicted in Chart 21, stimulus prompts attempt to focus learner attention on task relevant stimulus characteristics. Stimulus prompts can range from the teacher's pointing to the task stimuli, to having the learner touch the stimuli, to highlighting cues (such as the color being used to differentiate the 'b' from the 'd' in the chart example). It is essential that learners attend to all task relevant stimuli before responding. Whenever feasible learner attention should be very overt and observable. For instance, having learners touch task stimuli insures that they have looked at them. Requiring attention to task can inhibit impulsive responding

CHART 21

Basic Direct Instruction Format and
Select Error Remediation Procedures

Task: Discriminate between a spoon and a cup when presented a spoon and cup and asked to "Touch spoon."

Basic Sequence	Correct Response	Error Response	Remediation Procedure
1. Attention to task "Larry look" or "Larry listen"	Larry looks at teacher	Larry looks around room	Stimulus Prompt Reinforce another learner for looking or physically turn learner's head toward task
2. Attention to task relevant stimuli "Larry look at these"	Larry looks at the cup & spoon	Larry looks away from the cup & spoon	Stimulus Prompt Teacher points to cup & spoon and/or has Larry touch the cup and spoon
3. Cue to respond "Larry touch spoon"	Larry touches spoon	Larry touches cup Larry grabs cup Larry grabs spoon	Response Prompt Teacher immediately touches spoon and physically assists Larry to touch spoon after saying "Larry touch spoon"

Task: Label sight word flashcards when the teacher holds up a card and asks "what word is this?"

Basic Sequence	Correct Response	Error Response	Remediation Procedure
1. Attention to task "Larry look"	Larry looks at teacher	Larry looks away	Stimulus Prompt Reinforce another learner for looking or physically turn learner's head toward the task
2. Attention to task relevant stimuli "Larry look at these"	Larry looks at flashcards	Larry looks away	Stimulus Prompt Teacher points to flashcard and/or turns learner's head toward the cards
3. Cue to respond "What is this word?"	Larry says correct word	Larry says wrong word Larry touches the flashcard	Response Prompt Teacher says "this is the word _____" prior to asking "what is this word?"

and the use of gambling strategies.

There are three basic types of response errors learners can make: making the right class response in the presence of the wrong task stimulus (e.g., touching the cup instead of spoon or saying ball instead of bat); making the wrong class of response in the presence of the correct task stimulus (e.g., grabbing the cup instead of touching it); and making the wrong class of response in the presence of the wrong task stimulus (e.g., grabbing the spoon instead of touching the cup).

It is important to analyze the type of response error learners make because each type of error typically required a different prompting procedure. If learners perform the correct class of response in the presence of the wrong task stimulus, one can infer that they can differentiate what class of response to make (e.g., point, pull, pick up, label) and the error occured because they failed to discriminate between the task stimuli. In this case a stimulus prompt is needed to facilitate them learning to discriminate between the task stimuli.

When learners perform the wrong class of response in the presence of the correct task stimulus, one can infer that they can discriminate between task stimuli. The problem is that they do not differentiate which class of response should be performed. In this case a response prompt can be used to facilitate learners differentiating which class of response to perform. When learners emit the wrong class of response in the presence of the wrong task stimulus, both stimulus and response prompts are indicated.

Direct instructional procedures should be based on a careful analysis of individual errors. The type of errors learners make should be pinpointed and instructional prompting and/or correction prompt precedures should then be developed to directly remediate the type of errors.

Response Deficits

Individuals can know what response to perform but be unable to perform the response. A learner with cerebral palsy may know that he/she should zip up his/her jacket when it is cold but be unable to perform the motor movement. Most golfers know that when they are within 120 yards of the green that they should select a nine iron, keep their heads down and hit the ball with a full swing. However, many golfers cannot consistently perform this response. A learner may know what a 'p' looks like and understand that he/she is to print a 'p' but be unable to pring a legible 'p'. In such cases the responses have to be built. The changing behaviors in small steps procedures previously described can be employed to build responses.

We have attempted to neatly categorize the types of errors learners make into performance problem errors, discrimination errors, and response deficits. Learners' error patterns should be carefully analyzed since each type of error typically requires a different remediation procedure. However, it is highly probable that difficult to teach learners will simultaneously make two or more types of errors on the same task. For example, learners may frequently not respond (a performance error indicating a need to select a more powerful reinforcer); fail to discriminate between task relevant stimuli (indicating a need for stimulus prompts); and inconsistently perform the correct class of response (indicating a need for response prompts). A program very rich in reinforcement and prompts would have to be developed for such learners. It is likely that conditions, behavior, and criterion will all have to be changed in small steps to facilitate skill acquisition.

Mastery

As discussed in Chapter III, Haring, White and Liberty (1980) delineated a series of learning stages encompassing acquisition, fluency building, generalization, and application. Thus far we have primarily dealt with skill acquisition or the interval between the appearance of a desired behavior and reasonable accurate performance. However, skills do not become functional until they can be appropriately applied and generalized across tasks of independent living within and outside of school environments. That is, learners should be fluent in the skills (e.g., perform the skills at rates, durations, and accuracies which make them functional), maintain the skills, and generalize the skills across independent living tasks.

Once a skill has been acquired, fluency and generalization can be taught concurrently. Fluency involves teaching a skill to a criterion that allows the skill to be used in a meaningful manner. For example, if a learner can count out the right amount of money to purchase items in a store but takes five minutes, the learner has acquired the skill but needs to perform the skill more rapidly for it to become functional. For another example, a learner who can sound out words but takes ten seconds per word, has acquired a decoding skill and should be taught to decode words smoothly and quickly. Haring and Eaton (1978) articulated three definitions of fluency which included the performance of the skill at some level which: a) insures maintenance, b) insures success in later or related tasks and skills, and c) insures some level of comparable performance to that of others.

At least four procedures may be employed to facilitate maintenance of acquired skills: periodically reviewing and retraining the skills as necessary, interspersing practice on previously acquired skills with the training of new skills, overpracticing (drilling) acquired skills, and assuring that

after skills have been acquired learners are provided repeated opportunities to practice the skills in tasks of independent living.

Skills often drop out due to lack of opportunities to practice or perform them. One procedure to increase both the functionability and maintenance of skills is to frequently require learners to use the skills in leisure time activities and tasks of daily living. To accomplish this a number of potentially functional tasks which frequently occur in and outside of school can be delineated and the learners can be required to perform the tasks. Chart 22 illustrates a few potentially functional tasks for selected skills. In addition, most skills can be practiced through games. For example, reading words can be practiced through board games in which learners have to correctly demonstrate skills depicted on board squares or chance cards in order to remain on the square.

Procedures such as providing overpractice (drills) on acquired skills have been demonstrated to be effective in facilitating skill maintenance (Haring and Eaton, 1978). However, repeated practice on skills is often tedious for both the educator and learner. Learners typically have to be provided with high levels of reinforcement to maintain responding (avoid performance problems) during repeated practice. In addition, drills enhance skill functionality. Although drills are effective in enhancing skill maintenance, it is suggested that performance of skills in tasks of independent living and recreational activities be given at least equal emphasis to drills.

Fluency also involves teaching learners to perform such skills as counting out money and sounding out words at appropriate rates, reading survival words, such as danger, with a high degree of accuracy, walking long distances

CHART 22

PERFORMANCE OF SKILLS ACROSS FUNCTIONAL TASKS

Skills	Potentially Functional Tasks				
Word attack skills	Leisure time reading material	Newspaper	Recipes	Signs	Menus
Addition and subtraction skills	Budgeting money	Determining if enough utensils are available for setting the table	Keeping score in a game	Making change	
Dressing skills	Dressing for day	Dressing for gym	Dressing to go outside	Dressing before and after toileting	Dressing for swimming
Labeling objects	Requesting objects when indicating wants and needs	Describing objects			

(duration) and maintaining head control for long lengths of time (duration) to facilitate success in later related tasks and tasks of independent living. The changing criterion procedure described earlier can be used to increase rate, accuracy, and duration of skills in small steps from the learner's current level of performance to an acceptable criterion. In addition, rate, duration and accuracy games can be devised and used as leisure/free time activities for learners. Teaching to rate, duration, and accuracy criteria should also facilitate skill maintenance since learners are receiving repeated practice on the skills.

Fluency criterion for rate, duration and accuracy of skill performance should be both academically and socially valid. For example, the rate of sounding out cv words is academically valid when the rate facilitates success in sounding out words in later related tasks (e.g., cvc, ccvc, cvcc words). The rate for counting money is socially valid when it approximates the rate at which people typically count out money.

Skill generalization and application is facilitated when learners' skill performance is fluent. Lack of fluent skill performance can inhibit meaningful use of skills such as counting out money or sounding out words in tasks of independent living. Skill generalization can be taught and assessed through the deductive and inductive teaching procedures described previously. In addition, skill generalization is enhanced when learners are required to perform the skills across tasks of independent living and recreation. That is, the same procedures of requiring skill performance across tasks which should facilitate skill maintenance should also enhance skill generalization.

In our experience learners sometimes make performance errors because we have taught skills to an acquisition level but have failed to systematically teach fluency and generalization. In fact, many curricula and assessment tools used

with difficult to teach learners do not directly attend to fluency or generalization. As a result, assessment information can indicate that learners can perform or have acquired skills but there is no assurance that the skills have been learned to a criterion that allows them to be used in a meaningful manner. As educators we are concerned with teaching functional skills and must provide as much emphasis on teaching to fluency and generalization as we place on acquisition.

In addition to the factors described above, an ecological analysis approach can be employed to facilitate skill fluency and generalization (Brown, Falvey, Baumgart, Pumpian, Schroeder, and Gruenewald, 1980). As referenced herein an ecological analysis approach involves selecting skills to be assessed and taught plus determining the condition and criterion for skill performance on the basis of an analysis of the skill requirements of the environment where the skill will ultimately be performed. The ecological analysis approach is an environmental approach to assessment and instruction. That is, instead of using commercial curricula and assessment tools as the primary or only basis for selecting skills to be assessed and taught, community domestic living, vocational, recreational, and other community environments in which learners currently function or may function in the future are analyzed to determine what skills to assess and teach.

An ecological analysis can usually be accomplished in the following steps (Brown, et al., 1980). First, general environments in which learners currently function or may function in the future are delineated. Typically, the environments include domestic living, recreational, vocational and other community environments. These environments become the curriculum domains.

Next, more specific environments in which learners currently function or may function in the future are derived. For example, current environments in the curriculum domain of domestic living include natural homes, foster homes

and group homes while potential future environments could include group homes, supervised apartments and houses. After the environments have been articulated, subenvironments for each environment may be articulated. For instance, the subenvironments for a house could include bathroom, kitchen, bedroom, living room, hallway, dining room and basement.

Once the subenvironments have been derived, major activities which typically occur in the subenvironment can be listed. Major activities for the kitchen could include cooking, washing dishes, setting the table, eating, making conversation, cleaning up, etc. Finally, each activity is task analyzed to determine what skills are typically exhibited in the completion of the activities and under what conditions and at what criterion the skills are performed. That is, cues which typically evoke skill performance (the highest level in prompt hierarchy previously delineated), naturally occurring instructional and correction prompts (previously refered to as instructionally convenient prompts) and the criterion for meaningful or functional skill performance (fluency) can be determined. The cues, prompts and skill performance criterion delineated may be used as the mastery conditions and criterion for skill performance.

Assessments of learners can be performed by conducting a discrepancy analysis between learners' skill performance and the skills required in the environments. That is, learners can be assessed in the actual environments and/or environments which stimulate the performance criterion conditions of the environments in which the skills are ultimately to be performed. A discrepancy analysis may indicate that learners need to acquire certain skills and/or that learners can perform the skills but must be taught to perform them under the desired conditions and/or at appropriate criterion. As articulated by this brief description of the ecological analysis approach, the approach insures that learners are assessed on and taught skills under con-

ditions and at criterion similar to those which occur in environments in which skills are ultimately to be performed, facilitating skill fluency and generalization.

The ecological analysis approach assumes that difficult to teach learners do not readily generalize skills and that learners must ultimately demonstrate and often be taught to perform targeted skills in the environments in which they are ultimately to be performed. Acquisition instruction may take place in typical classroom environments or in environments which stimulate ultimate skill performance environments. However, the ultimate test is whether learners can perform the skills in current and potential future community environments. To accomplish this, instructional programming must extend beyond the classroom into current and potential future community domestic living, recreational, vocational and other community environments.

The ecological analysis approach does not represent a particularly new or innovative strategy for facilitating skill mastery (fluency and generalization). For years, pre-school teachers have analyzed the academic, social and survival skill requirements of kindergartens and first grades to determine what skills to teach under what conditions at what criterion to enhance success in kindergarten and first grade; special class and resource room teachers have analyzed the academic, social and survival skill requirements needed to transition learners into the regular classroom; vocational teachers have analyzed the vocational, social and survival skills necessary to transition learners into employment; and undergraduate pre-medical and pre-law programs have analyzed the skills necessary for learners to be admitted into medical and law school and so on. However, the ecological analysis approach provides a basis for determining

what to teach under what conditions and at what fluency criterion. It offers an alternative to using commercial curriculum and assessment tools as the sole basis for diagnosis and curricula selection while emphasizing functional skills, fluency and generalization.

Summary

As delineated herein implementing effective and efficient instructional programming for difficult to teach learners encompasses at least the following elements:

1. Adopting the philosophy of an environmentalist and assuming that learners do not fail but instructional programs fail. That is, inappropriate environmental arrangements produce and maintain learner skill deficits and appropriate environment arrangements can result in higher levels of performance. Persistence in systematically rearranging the educational environment is one key to success with difficult to teach learners.
2. Maximizing direct instructional time and efficiently managing instructional resources such that learners have sufficient time to acquire skills and educators can manage their workloads should result in a more pleasant, enjoyable and effective environment for both learners and educators.
3. Developing instructional programs such that they:
    a. accurately assess learner levels of current performance
    b. utilize reinforcers and prompts which will efficiently teach new skills and remediate performance problems
    c. break learning into small step instruction
    d. analyze learner correct and error performance such that the remediation procedure can directly impact upon acquisition, fluency and generalization challenges
    e. teach functional skills through activities of daily living and recreational/leisure time activities
    f. emphasize skill maintenance, generalization and application as well as skill acquisition.

We have deliberately chosen to present a very limited set of procedures which can be used in the instruction of difficult to teach learners. The main approach we have attempted to present is educational environmentalism and teaching functional skills. The environmental approach makes three basic assumptions: 1) skills are taught, maintained, and generalized through the systematic arrangement of the environment; 2) educators are responsible and accountable for delineating the most appropriate arrangements for individual learners; and 3) learners should be taught skills that they can fluently use and generalize across environments plus use in related and higher level tasks.

REFERENCES

Brown, L., Falvey, M., Baumgart, D. Pumpian, I., Schroeder, J., and Gruenewald, L. Strategies for teaching chronological age appropriate functional skills to adolescent and adult severely handicapped students. Madison, WI: Madison Metropolitan School District, 1980.

Haring, N.G., and Gentry, N.D. Direct and individualized instructional procedures. In N. Haring and R. Schrefelbusch (Eds.) Teaching special children, New York: McGraw-Hill, 1976.

Haring, N.G., Liberty, K.A., and White, O.R. Rules for data-based strategy decisions in instructional programs: Current research and instructional implications. In N.G. Haring, B. Wilcox and L.J. Brown (Eds.) Methods of instruction for severely handicapped students, Baltimore, Paul H. Brookes, 1980.

Haring, N.G., Lovitt, T.C., Eaton, M.D., and Hansen, C.L. The fourth R research in the classroom. Columbus: Charles E. Merrill, 1978.

Haring, N.G., and Schrefelbusch, R.L. (Eds.) Teaching special children, New York: McGraw-Hill, 1976.

Lindsley, O.R. Direct measurement and prosthesis of retarded behavior. Journal of Special Education, 1964, 147, 62-81.

Resnick, L.B., Wang, M.C., and Kaplan, J. Task analysis in curriculum design: A hierarchically sequenced introduction to mathematics curriculum. Journal of Applied Behavior Analysis, 1973, 6, 679-710.

Smith, D.D., Smith, J.O., and Edgar, E.B. Prototypic model for the development of instructional materials. In N.G. Haring and L.J. Brown (Eds.) Teaching the severely handicapped, Volume 1. New York: Grune and Stratton, 1976.

Snell, M. Systematic instruction of the moderately handicapped. Columbus: Charles E. Merrill, 1978.

Streifel, S., Bryan, K., and Aikens, D. Transfer of stimulus control from motor to verbal stimuli. Journal of Applied Behavior Analysis, 1974, 7, 123-135.

Streifel, S. and Wetherby, B. Instruction-following behavior of a retarded child and its controlling stimuli. Journal of Applied Behavior Analysis, 1973, 6, 663-670.